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THE USE OF RESERPINE IN AUTISTIC CHILDREN[1]

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A considerable number of papers have been published recently dealing with the effects of reserpine on emotionally disturbed adults (1, 3, 9, 10, 11). As yet, there are relatively few reports concerning the use of this drug in childhood behavior (12, 13). The authors, therefore, have investigated the effects of reserpine on nine autistic children. Early infantile autism is a definite clinical syndrome, which was described and extensively studied by Kanner (5). There is still some controversy concerning the nature of this disorder. The weight of evidence, however, favors the opinion that this syndrome is the consequence of schizophrenia in early infancy.

The picture presented by early infantile autism varies from child to child, not only in detail but also in severity. Only a brief description of the most characteristic features need be presented here. Our cases were especially severe. All nine children were more or less withdrawn into a world of their own, and appeared not even to see the people about them. They accepted parental care without responding with any evidence of attachment, and they appeared to have no need for adult attention. They did not relate to other children except very minimally to their own siblings. This lack of relatedness to human beings is outstanding and characteristic of infantile autism. Although ignoring people, slightly less ill autistic children may show an interest in toys and other inanimate objects. Of our nine children, only four played with toys or evidenced noteworthy awareness of things about them. In the worst cases, no speech develops. Six of our nine children never spoke a word in our presence. The somewhat less ill child acquires words by repeating, unchanged, whatever he hears. This echolalia was present in our other three children and had persisted indefinitely. Partly as a consequence of the echolalia and partly due to a lack of a concept of themselves, these same three children reversed the personal pronouns, referring to themselves by the second or third person. Only occasionally was speech used by them for communication. In six of our children, the affect was frequently inappropriate; in two more, it was blunted; and in the remaining child, evidence of affect was usually absent. Bizarre motility disturbances were present in seven children, including grimacing and mannerisms. In four, jumping was conspicuous. Two of the nine children were frequently assaultive without provocation. For the purposes of this report, these highlights should sufficiently identify this syndrome and indicate the special severity of our cases.

Methodology

For our investigation there were available 7 boys and 2 girls, whose ages ranged from 3½ to 9 years. Four of these children with ages ranging from 7½ to 9 years had already been attending our small nursery for schizophrenic children from 3 to 4 years. Thus they had been carefully observed previously over a long period of time. They, however, constituted a

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very severe test of the drug since they had failed to respond to the nursery program. Moreover, three of these four had as yet acquired practically no speech. According to the reports of Kanner and Eisenberg (6), children of this type, who have not begun to speak by the age of 5 or 6 years, have a very poor prognosis. The remaining 5 children, varying in age from 3½ to 6 years, had not received prolonged prior observation. However, they too were severely autistic, and only two of the five had as yet acquired any speech. One of these five is noteworthy because he was one of a pair of identical autistic twins. This twin, a little more severely affected than the other, was chosen to receive the reserpine, and the slightly better twin was kept as an untreated control.

In order to observe and record as accurately as possible the status of our children, a psychiatric rating scale was employed. On this scale, a normal child is rated 0. A mild disorder is rated 1 or 2; a moderate one, 3 or 4; and a severe one is rated 5 or 6. Thus, a rating spectrum is obtained, in which 1 represents the mildest degree of illness and 6 the most severe. Each child was assigned by us an over-all rating at significant times during our investigation. As a further aid in the rating process, we employed a modification of the Psychiatric Rating Scale of Malamud and Sands (8). In order to adapt this scale for children, we changed the function "work" to school-work, and added the categories: play, toilet-training and abnormal motility. Thus, 22 functions were rated instead of the 19 of Malamud and Sands. These various functions were likewise recorded on a rating spectrum ranging from 0 to 6. Additional details concerning the rating system used would only unduly lengthen this paper, and may be reserved for possible future report.

An additional check upon the status of these children during the course of our investigation was obtained by placing seven of them for periods ranging from 2 to 8 months in our day nursery referred to above. By this means, independent reports on the children were obtained at intervals from the nursery personnel. All nine children were living at home, and at each visit much additional information was obtained from their parents.

In accordance with our plan for the investigation, the reserpine in the form of the Elixir of Serpasil was started with a dosage of 0.2 mg. three times a day. Then, at one-week or two-week intervals, the dose was gradually increased to a maximum total daily dose of 9 to 12 mg. Our object was to determine the limit of tolerance and the optimum dose of the drug for each child. To do this required from 5 to 7 months. All the children were then abruptly changed without the parents' knowledge to placebo, and the effect noted. This technique was deliberately chosen by us instead of the popular "double blind" method because with such severe cases, the subjective element in assaying an improvement is minimal. Moreover, it was necessary to individualize the dosage in each case, rather than follow a rigid schedule. In addition, it has been our experience that when using such large doses of a potent drug like reserpine, which has some characteristic side and toxic effects, the therapist usually cannot be kept in ignorance, and he generally recognizes that any child who develops these typical effects is receiving the drug and not the placebo. Except for the autistic twin, our plan provided no untreated control. A control group would have been impractical with so few autistic children available at the initiation of our investigation. Instead, we decided to compare the progress of our cases with the progress of about one hundred similar children, reported by Kanner and Eisenberg (6) in follow-up studies.

Results of Therapy

While on the optimum dose of reserpine (3 to 7 mg. per day) there occurred more or less improvement in each case, particularly tranquilization. The children were calmer, less hyperactive, easier to manage at home and elsewhere, and at night they went to bed and to sleep earlier. Prior to treatment, two children were up and about much of the night, but with reserpine they slept through the night. After a strenuous day caring for these very disturbed youngsters, the parents appreciated this effect. So much so, that after the drug had been discontinued by us, two parents, independently, soon resumed the late afternoon or early evening dose. Altogether, six children showed an improved sleeping pattern while on reserpine. With optimum adjustment of dosage, this

TABLE 1

Case	Age	Sex	Rating Before	Rating After	Remarks
C. P.	7½	M	6	5	In State Hospital now
C. F.	8½	F	5	4	
P. Des.	8	M	6	5	
G. R.	9	M	6	5	In State Hospital now
E. F.	5	M	6	5	
J. A.	6	M	4	2	
R. V.	5½	M	5	3	
B. R.	3½	F	6	5	
S. M.	5	M	5	4	Treated twin
T. M.	5	M	4	4	Control twin

could be accomplished without the children being semistuporous all day.

The evaluation of progress was difficult in certain cases where the clinical improvement was minimal. In our opinion, however, besides the tranquilizing effect, there was some progress in emotional maturation in all our children. Expressed by the over-all rating (table 1) five of our children had an initial rating of 6, and all of these improved sufficiently to be rated 5. Three additional children had an initial rating of 5. Of these, two improved to 4 and one to 3. The one remaining child started with a rating of 4 and progressed to 2. It is noteworthy that the treated twin improved from a rating of 5 to 4, while the control untreated twin with a rating of 4 remained unchanged.

Expressed clinically, while on optimum dosage, these children appeared more aware of the real world and of what was going on in their environment. They would look sometimes at the examiner, whereas previously they appeared not to perceive him. Not only awareness of people, but relatedness to them, was improved in varying degrees.

Those children, who changed less, showed an increased ability to relate to the mother, while those who made more progress, related better to the psychiatrist or the nursery teacher, and the two children who made most progress were able to engage in some play with other children. In addition to the reduction of autism, there was improvement in the pattern of play. For example, one child developed some ability for organized play with dolls and household articles. Another child changed from destructive play activities centering around the toilet to more constructive play with blocks, dancing and music. These last two children acquired an increased ability to communicate on a nonverbal level, chiefly by means of gesture. In two children, the affect became less rigid and more evidenced by facial expression. Four children had a better appetite and one of these, who previously took only soft foods, began to eat solids.

Side Effects, Toxic Symptoms and Withdrawal Syndrome

Minor side effects occurred in some children. Nasal obstruction appeared in four children, and grew less or disappeared spontaneously after periods ranging up to 6 weeks. Dryness of the mouth, especially the lips, was noted in one child. Increased somnolence with napping during the day occurred in all the children as the dosage level was raised but tended to diminish or disappear usually within one to two weeks as tolerance for a given dose was acquired. Phenidylate in the form of Ritalin, added as a single morning dose of 10 mg. in two cases only, eliminated or diminished the tendency to somnolence. Finally, after the dosage of reserpine was reduced to the optimum level and the drug administered mostly late in the day, daytime somnolence was no longer present. In most of the children, there was some increase in appetite, and this effect might be of value in patients with anorexia. In some cases, there was also an increased intake of fluids, perhaps due to the dryness of the mouth.

When the dosage of reserpine exceeded the optimum, toxic symptoms eventually appeared in four children, but, even with a dose of 10 to 12 mg. a day, no serious effects were observed. The most marked instance occurred in a girl of 7½ years who, on larger doses of reserpine, became more disturbed, developed insomnia, became hyperactive and had oculogyric crises lasting up to 2 hours. In this same girl, the increase in appetite was so great that a marked gain in weight occurred, resulting in definite obesity. In this child, some of the increase in appetite persisted after the medication was discontinued. This same girl had been trained for bladder control for 2 years but, while on toxic doses, enuresis was present. Similarly,

while on too large a dosage, a well-trained 8-year-old boy developed both diurnal and nocturnal enuresis, and in one child dribbling of urine following micturition occurred. Another boy had frequency of urination, perhaps associated with increased fluid intake. Thus, four of the children developed some urinary symptoms while on the higher dosage. These symptoms, therefore, were regarded by us as toxic manifestations rather than side effects. In two children, there occurred periods of depression with crying lasting one to two hours. In all cases, toxic symptoms disappeared on lower doses of reserpine. Even the girl referred to above with the most marked toxic symptoms obtained worthwhile tranquilization while on one dose a day of 3 mg. at 5 p. m.

A withdrawal syndrome appeared in two of the nine children within one week after they were changed to placebo. This was manifested by severely psychotic symptoms, much more violent than those originally present. The status of these two children were then best categorized as ultra-severe, even beyond 6 on our rating spectrum. For example, one boy of 7½ years was constantly hyperactive, hardly sleeping at all, screaming for long periods, scratching his mother and pulling out her hair. With 4 to 6 mg. per day, he reverted back to the preplacebo stage. Another boy of 5½ years presented a similar picture, constantly screaming, sleeping very little, grimacing, head banging, destroying everything at home, appearing to hallucinate and, after being toilet trained for 2 years, becoming enuretic and encopretic. After this syndrome had persisted approximately one month without improvement in either of these boys, the reserpine was resumed at the rate of 3 mg. per day and was increased rapidly to 7 mg. per day, and the two returned to their status before the change to placebo. A weekly reduction of 0.5 mg. in their daily dosage of reserpine has since been possible. The children are now being maintained on a dosage of 3 mg. per day. Recurrence of the withdrawal syndrome has not become evident, but it is as yet uncertain whether the drug can ultimately be discontinued entirely. In five additional cases, the drug was restarted after 2 to 4 weeks because, although this violent withdrawal syndrome was not present, the children had become more disturbed without reserpine.

Discussion

Starting with minimal doses, we have been able to develop a tolerance for reserpine. Such a procedure enables the therapist to prescribe an optimum dose, which in our autistic children varied from 3 to 7 mg. a day, with an average of 5 mg. In some cases, a single late afternoon or early evening dose, usually 3 mg., gave the best results. By this method, overtranquilization and daytime somnolence were avoided. Our study indicates that autistic children appear to have a particularly high tolerance for reserpine so that even with these relatively high doses, a sufficient margin of safety is present. In the form of Elixir of Serpasil, which has a rather pleasant taste, we experienced no difficulty in administering the drug, as all our autistic children took it without resistance, apparently liking it, some even attempting to help themselves to it if it was left within their reach.

The improvement that occurred in these nine children has been recorded here both descriptively and as measured by a rating scale. In the evaluation of our results, we have distinguished between tranquilization and progress in emotional maturation. In addition, we should consider separately the older group of 4 children ranging in age from 7½ to 9 years, who had already been in our nursery for 3 to 4 years and who, according to Kanner and Eisenberg (6), had a poor prognosis. This older group obtained worthwhile tranquilization. Their previous progress had been minimal, and in only one of these four was the rate of progress slightly improved. On the other hand, the younger unselected group of 5 children varying in age from 3½ to 6 years did better. Two of the children in the latter group in particular developed better interpersonal contact and were able to gain something from the nursery experience. In these two cases, the progress was rather substantial. The question may be raised whether the betterment was (a) the result of the drug, or (b) the result of the natural tendency to improvement, which Eisenberg (2) has pointed out as being present in some of these children, or (c) the result of psychotherapeutic effects of our nursery set-

ting. We are unable to answer this question with any degree of certainty since, with such a small series, we cannot conclude that our results were statistically significant. Our impression, however, is that the increased awareness of the environment and the increased relatedness to people, which seemed to follow the administration of reserpine, helped to make the children more receptive to psychotherapeutic influence.

We have as yet found no report that enuresis could result from reserpine. On the other hand, Lambros (7) published an article on the use of comparatively small doses of this drug for enuresis. The possible mechanism by which the enuresis is produced is uncertain. In our four children, the urinary symptoms seemed to be a toxic effect of overdosage. Pharmacologic action of reserpine upon the urinary sphincters or some part of the nervous system, possibly parasympathetic predominance, may have caused the enuresis. Psychologic factors too might play a role. The reserpine may produce dryness of the mouth with consequent increase in fluid intake and urine excretion. Perhaps then the presence of this greater quantity of urine played some part in the enuresis.

According to various reports, Parkinsonism may be a toxic effect of reserpine in adults. Goldman (4) observed Parkinsonism in 65 or 14.9 per cent of 442 adults, who received daily doses ranging from 3 to 15 mg., with a median dose of 6 mg. a day. He even suggested that the production of Parkinsonism helped to relieve psychotic symptoms. Our children took large doses of reserpine, and one girl developed oculogyric crises. This was the only instance in which we detected any of the phenomena associated with Parkinsonism.

The occurrence of a severe drug withdrawal syndrome in a small percentage of individuals who have been reserpinized is worth recording. We have as yet found no report of such an experience in the literature. Nevertheless, we have some reason to believe that others have observed this phenomenon. The mechanism, by which the withdrawal syndrome is produced, is uncertain. Although more severe and more prolonged, it may be similar to the withdrawal syndrome that occurs in narcotic addicts. Perhaps the reserpine relieved some metabolic deficiency or changed the homeostatic equilibrium of the patient. Then, when the reserpine was withheld, a disequilibrium may have ensued which the body could not easily rectify. Besides these possible physiologic and pharmacologic mechanisms, psychologic mechanisms may have precipitated the withdrawal syndrome. Whereas with tranquilization, anxiety may have been diminished. When the drug was withheld, anxiety may have mounted, particularly because of the increased contact with reality that occurred during the reserpine administration. Thus, in these psychotic individuals, there occurred a regression into a particularly violent psychosis. In this connection, it would be interesting to know whether this withdrawal syndrome also occurs in non-psychotic individuals after the withholding of reserpine. None of the possible mechanisms suggested above explains why this syndrome occurred in only a small percentage of the cases. Although a full explanation is obscure, it is sufficient for our purpose to point out that resumption of the drug relieves the withdrawal syndrome.

Summary

The use of reserpine was tested in nine severely autistic children. Worthwhile tranquilization was obtained in all the children. This resulted in diminished hyperactivity, less aggressiveness, and better sleep at night. Progress in emotional maturation was slight, particularly in a group of four older children. However, it was substantial in two of five younger children. In no case did an autistic child become normal. The optimum dose for each child was determined. With this dose, side effects were minimal. In two cases, a severe drug withdrawal syndrome occurred which could be relieved by resuming the drug.

Conclusions

Reserpine may be useful in autistic children, but it is by no means a panacea. By inducing tranquilization, by promoting more human relatedness and by favoring some emotional maturation, reserpine may allow for psychotherapy and education of the autistic child, which might otherwise not be possible.

BIBLIOGRAPHY

1. Barsa, J. A., and Kline, N. S.: Treatment of Two Hundred Disturbed Psychotics aith Reserpine, *J. A. M. A., 158:* 110–113, 1955.
2. Eisenberg, L.: The Autistic Child in Adolescence, *Am. J. Psychiat., 112:* 607–612, 1956.
3. Fogel, E. J.: Physiological Studies after Continuous Serpasil Therapy over 18 Months, *Dis. Nerv. System, 17:* 322–323, 1956.
4. Goldman, D.: The Major Complications of Treatment of Psychotic States with Chlorpromazine and Reserpine and Their Management, *Psychiatrics Res. Rep., 4:* 79–88, 1956.
5. Kanner, L.: Autistic Disturbances of Affective Contact, *Nerv. Child, 2:* 217—250, 1943.
6. Kanner, L., and Eisenberg, L.: Notes on the follow-up studies of autistic children. In *Psychopathology of Childhood.* Hoch and Zubin, eds. New York: Grune & Stratton, 1955.
7. Lambros, V. S.: The Use of Reserpine in Certain Neurological Disorders: Organic Convulsive States, Enuresis, and Head Injuries, *Ann. New York Acad. Sc., 61:* 211–214, 1955.
8. Malamud W., and Sands, S. L.: A Revision of the Psychiatric Rating Scale, *Am. J. Psychiat., 104:* 231–237, 1947.
9. Naidoo, D.: The Effects of Reserpine (Serpasil) on the Chronic Disturbed Schizophrenic, *J. Nerv. & Ment. Dis., 123:* 1–13, 1956.
10. Noce, R. H., Williams, D. B., and Rapaport, W.: Reserpine (Serpasil) in the Management of the Mentally Ill and Mentally Retarded, *J. A. M. A., 156:* 821–824, 1954.
11. Noce, R. H., Williams, D. B., and Rapaport, W.: Reserpine (Serpasil) in the Management of the Mentally Ill, *J. A. M. A., 158:* 11–15, 1955.
12. Talbot, M. W.: The Use of Reserpine in Irritable and Hypertonic Infants, *Ann. New York Acad. Sc., 61:* 188–197, 1955.
13. Zimmerman, F. T., and Burgemeister, B. B.: Preliminary Report Upon the Effect of Reserpine on Epilepsy and Behavior Problems in Children, *Ann. New York Acad. Sc., 61:* 215–221, 1955.

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MENTAL DANGER, STRESS AND FEAR

Part II. Man and his Morale

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1. Introduction

What are the factors that determine man's inner mental strength in the turmoil and stress of life as well as during crises? How vulnerable is he, especially under the impact of danger and stress? The answer to these questions can be found in the state of his inner strength and fortitude which will imply how we can expect him to react to the troubles and dangers of our time. Usually in the field of psychopathology man's failure and his limitations are studied so that his behavior may be better understood. Yet, an approach from a positive health angle may appeal to the reader as well.

The rather vague concept of morale may be applied to a single person or to a group. If we evaluate people's reactions as favorable, we usually speak of morale as being high or good; if unfavorable or subnormal, it is called low or poor. When morale is high, there is a feeling of adequate control of the situation and of self-confidence; there exists a sense of direction and purpose—everything falls into line. This sense of confidence does not depend solely upon external circumstances. Even when we have not given a satisfactory definition of the concept, most people are aware of the fact that military and civilian morale both are dependent upon a combination of internal and external factors. Morale may be high in the most difficult and dangerous situations. On the other hand, it may be low even in times of apparent peace and quiet. What is usually called good morale in the person is a quality of strength that is built up from within by faith in one's goals and in one's capacity to meet a challenge. It comprises, generally speaking, mental stability, inner strength, a stable harmony between instinctual drives and yearnings and their inner controls. In this study I want to look on the subject of morale from different angles. This implies the danger of being repetitious. Nevertheless, it is important to walk around the subject in order to scout the various byways leading to the core of the problem.

2. In Search of a Definition

Morale as defined in the dictionary is a "state of mind". It is because this concept is so important, so tied in with possible success or failure of man and his society, that we are compelled to examine the meaning of the word more closely and to observe how morale is generally affected. A review of this subject becomes all the more urgent since the *cold war* has been making a psychological attack on our morale.

The word is derived from the Latin word moralis and has come down to us by way of the French. Though originally mos, mores, meant manners or morals, the pure depiction of habits and way of life of people, "morale" as we use it today has a more subtle meaning. Its meaning of a moral (ethical) attitude has gradually changed in favor of the moral backbone and strength behind it. In English we find this variation in meaning back in the difference between "ethical" attitude and "morale"; in Dutch we find the word *morality* used for the old meaning of being ethical and *moreel* for the later concept of inner strength. Nevertheless, this development of the word tells us that somewhere our evaluation of the concept of morale is related to a metaphysical and ethical one that can never be completely understood by reducing it to psychological terms.

Webster defines the word as the totality of certain mental factors as zeal, spirit, hope, confidence, on which an army depends in order to reach its goal. In our time with its growing knowledge of inner motivation and group behavior, the concept is continually changing. The word is most frequently used with reference to soldiers or industrial workers —whether their morale is good (high) or poor (low). Nowadays it is mostly used in relation to the inner strength of both collectivities and the individuals. Though for practical use we may define morale as the concept expressing the amount and quality of cohesive strength in the individual and the collectivity, we have to

be aware of the fact that the word is used to express various other meanings, some much broader and richer than others. It may refer simply to good team spirit and an ability to play the game with a group. Here it is chiefly the teamwork which counts—poor morale increases the collective vulnerability. But in a larger sense, morale goes much deeper and includes the mental capacity and stability of the individual as well as his strength and influence in working with a group.

In a discussion on morale among psychologists, I heard the following synonyms mentioned for the concept: nerve, resilience, faith, goal-directedness, tolerance, endurance, ego-strength, solidarity, fatalistic acceptance, élan, the capacity to learn and to grow, mental health, productivity and many others. All these terms are useful in illuminating the quality and capacity we are looking for.

Good morale among people implies that they are, on the whole, at ease in their minds and ready to respond adequately well, regardless of how dangerous the circumstances outside their group may be. Good morale is usually obtained when people have hope, faith, a sense of direction, confidence in their goals and the ability to attain them. They must have confidence in their leaders and in each other. There have to be developed a growing endurance and tolerance through protracted difficulties. They must feel that there is a good chance for success. In addition the feeling of moral support from marriage partners, family and friends is needed. An elaborate investigation into the pleasure and self-evaluation that people obtain through their work showed clearly that the way in which the sexual partner regarded and evaluated the laborer and his prestige in his work played an important role in his morale and self-esteem (51).

Poor morale—a term more used in the army—expresses a lack of self-confidence and a lack of trust in the goals and in the means to obtain them. There is also distrust of those who are engineering the strategy and patterns of war. In short, poor morale is the opposite of good morale. There is lack of inspiration. Where the morale becomes more and more indifferent, soldiers may even be easily bribed or "brainwashed" by the enemy. Where soldiers cannot identify themselves with the justified aims of war—as was the case of the hired Hessians who fought only for the money the British paid them, and thus made Washington's victory over them more possible—morale is indifferent or low. Such soldiers feel no personal pride, are easily surprised by the enemy, and easily taken off guard. They may be willing and even eager to surrender.

Although various words are used to describe what we mean by morale, yet in reviewing the subject we have to emphasize that these words are not enough. They do not express precisely the inner capacity of man to draw on power and strength. Morale expresses much more a potentiality, a cohesive inner strength and structural capacity which go beyond the concept of forces and energy as described in physics. We may better compare morale with the meta-biological concepts of vitality, homeostasis, stable equilibrium, regeneration, recuperability, self-preservation; and for the group concept, as mutual harmony, group preservation, team spirit, sportsmanship, integration, cohesive group strength. Gradually the concept of morale equals moral and mental health. Let us not forget that *health* is a metaphysical concept related to being a whole and holy.

Our pragmatic approach to the concept of morale will change as our ideal of life becomes different. Those who do not lay stress on security as an ideal but who love freedom and independence will think differently about morale than will those who have been trained to be dependent on parents or the state. Those who are trained to accept Faith or Fate above all will assume by religion imposed duty and responsibility as their guiding principle of morale. Those who have been educated in the awareness of free will will define this "living on their own account" and with all their inner resources as the basis of morale. The luxury of our technical culture makes rather passive and tends to cause people to accept failure too easily. Morale under these circumstances takes on a different tone. Here high morale is assumed to be with the gamblers of life. Those who invest all their strength and backbone in the community can only find a collective formula for the concept of morale. Personal education and ideology, however, will modify

these concepts, and no common denominator has as yet been found. There exists also a *pseudo-morale*, a collective illusion of strength, often artificially aroused and maintained and easily subject to collapse and breakdown. The collapse of the great, well-disciplined German armies at the end of the Second World War is an example of this. Yet, in a more subtle sense, pseudo-morale may be found in all the advertised strength of a country, for political or propapagandistic reasons, since the wish or the means to measure the situation objectively may be lacking.

But something common to all forms of morale may be mentioned. Morale connotates the acceptance of challenge, the acceptance of endurance and tolerance, if it does not threaten the instinct of self-preservation. One may call it the preservation of morality and humanity in man. Somewhere the concept of morale is also connected with that dark chapter of psychopathology that is called ego-psychology, describing the manifold mental defenses we have builtup against threatening intrusion and influences from inside and outside. Noticeable is the condition that inner urges toward destruction and disintegration also have to be under control.

My decision to limit myself to a more pragamatic and clinical description of factors determining morale in the individual is inspired by my wish to circumvent the easily aroused confusion in regard to some of the basic concepts. Social psychology will have to teach us more and more about group morale and the important social factors involved. By limiting myself to the clinical and individual aspects of the problem I can omit as many confusing, sophisticated terms as possible.

3. Some Basic Ambiguities in the Study of Morale

Even at the risk of affecting the patience and morale of the reader, we have to investigate some of the methodological difficulties in exploring subjective strength. Only when we are aware of some of the vicissitudes of our approach may we discreetly say that we have become more objective than before. The concept of "morale" as a psychological quality can only be explored by studying the frontiers of what is subjective. We never grasp the subjective quality immediately. Yet, we can ask the questions: Under what circumstances do we experience breakdown of behavior? What hampers morale? What boosts or lifts morale? The concept of morale was born out of an emergency and its relation to danger. It depicted certain group behavior, sometimes stimulated by danger, sometimes paralyzed by it. The problem of this ambivalent behavior belongs to the concept.

The so-called herkological approach (from herkos—hedge, limit) follows the Spinozistic rule: omnis determinatio est negatio—every definition contains a denial. Pathology reveals to us the frontiers of normalcy. We cannot define the essence of the concept of morale, but we can explore manifold limitations, analogies, illuminations of this rather metaphysical concept. Every time morale is challenged, we will get a response that can become subject to our study though we observe not morale itself. What we in medicine call the clinical approach is the description of all that we experience and connotate at this frontier where two complexes respond to each other, namely the subjective forces inside and all the forces acting from outside. The more approaches we bring to bear on any problem, the more chance we have to find and grasp its essential core. The more "throws" we make, the greater is the probability that we will hit our goal. I, for instance, cannot accept that we can transfer a science of qualifications into a science of quantifications. In this process of reduction to numbers something of the uniqueness of the individual gets lost. Science is characterized by its methodical approach to a problem. This, however, does not justify our prejudice as to what kind of method will be the chosen one. One "throw" at our goal does not help us, we have to try many times in different ways, remaining aware of the uniqueness of the individual at all times.

As we saw earlier, sometimes we try to express in the concept of morale a quantitative value, the amount of energy a person or group can display in the service of an aim; sometimes we express a high qualitative evaluation (or norm) with it. We speak of the high morale of the martyrs, the high morale and endurance of lonely war prisoners. Physical and moral values interplay in our evaluations of behavior.

Sometimes the physical preservation of the group is the ideal, sometimes the preservation of its cultural norms and values such as dying for justice or for God.

Self-preservation may clash with group preservation. Usually they coincide; in wartime they often clash. Consequently personal morale may be in contrast to group morale. Even our awareness that morale somewhere is supported by mutual communication—because cohesive strength is often impaired without communication—is replete with ambiguities. Sometimes, however, confusing communication may cause or communicate cowardice, panicky feelings and lack of morale. The function of warding off mental contagion that may weaken our morale is just as important as recognizing the fact that courage and mental strength are also contagious. The collectivity can give strength or weakness to the individual, in the same way the individual can inspire or paralyze the group.

Yet these difficulties in methodology do not have to prevent us from going on with our clinical descriptive approach.

Morale is primarily a psychological concept. It is more frequently used to express a quality of the psyche than its quantitative strength, and it is not primarily dependent on external difficulties. Indeed far from being dependent on freedom from difficulties it is challenged by difficulties and the various resistances of life. Obstacles may stimulate morale. A dull peace may be more devastating to morale than a situation containing challenging difficulties. Here we see the paradox of the matter. The different causes for the feeling of boredom in a peaceful existence and consequent depressed morale must be found largely in the false ideals and purposes underlying the situation that causes low morale and whether these false purposes are generally understood. The cause may also lie in those whose duty it is to make final purposes and goals known and felt by each individual. Here we touch again the importance of mutual communication.

For morale is not only a "state of mind" of a group but depends on the general emotional behavior of each individual in the group. Everybody contributes his own morale to the group and has his own private moral investments regarding what he wants to get out of the group. For example, it has been found that in an orphan asylum the morale of the children as a whole is distinctly raised by attractive clothes. The feeling a child has of his "self" and his unique identity is encouraged when he and his friends each have a different style of suit or dress, perhaps selected by each for himself. In school children, with their different emotional investment in the school, a certain amount of uniformity is looked upon as boosting their morale. Yet, too much regimentation of human beings lowers morale. This is particularly stultifying when applied to children. Children live in their immediate surroundings and cannot see goals or know of distant moral support as well as adults do. Something of the same kind, acquiring their morale by proxy, through borrowing strength from others, may apply to those who are ill or weak and largely dependent on others for their happiness.

Let us return to the present situation in our world today in which we more and more often hear the word "morale". These are times of unsettled questions, of indecision. We are all affected—consciously or unconsciously—by the cold war; we are all uneasy about distant moral support; we must all "carry on" at home in order to support the spirit of those who must go abroad to negotiate, to make decisions or even to fight. What can be done to keep the morale and group spirit of the citizenry good?

The same conditions that describe what raises or reduces morale among those on the battlefield will also describe the sources of good or low morale among the people at home. There may be some instances where the accent is different—as we pointed out in the contrast between what is felt by children in regard to domination and regimentation, for example, and what is felt by adults.

Let us see what occurs in an acute catastrophe even where initial morale among our citizenry is looked upon as high. Will there be breakdown and panic? Panic, simply defined, involves a sudden loss of a sense of direction, a loss of resourcefulness. The individual feels compelled to behave merely as if driven by outside forces—the rug has suddenly been pulled out from under him and he feels rudderless.

Even if the population is well prepared to face a possible diaster and has great self-

confidence, nearly all people will be overcome by fear temporarily. However, one need not automatically expect widespread panic and hysterical anxiety to break out during an air raid attack. Some of our Civil Defense authorities put too much emphasis on "panic" as a mysterious evil. In a well-organized governmental system, overt mass panic can be prevented.

My personal experience after the bombardment of Rotterdam, in which the old center of the city was completely wiped out, showed how well the population took it psychologically. The subsequent surrender and the occupation by the Nazis seemed to give the people a much worse shock than the actual acute devastation of their town. In other countries the people were more inclined to show panic reactions because they had been softened by a prolonged war of nerves and confusing anticipation. When France fell in June, 1940, panic was widespread because there had been political confusion, and the evacuation of the population had been poorly organized.

In 1943, during the Second World War, our Psychological Warfare Service was eager to get hidden information about the morale of the German people. It was difficult, indeed, to acquire objective reports. Although the country was continually being pounded by the Allied Air Forces, there were no apparent signs of decaying morale. Of course the German Press was not allowed to publish unfavorable matters. Suddenly, however, a significant story appeared in one of the German newspapers. In an Eastern German town, a rumor had been going around that a bear had broken loose from the zoo. Panic had spread, and mothers kept their children at home. It was finally necessary to announce in the newspapers that severe punishment would be meted out to anyone circulating the rumor further.

This incident revealed to us outsiders more than the fact that there was only a silly rumor. The incident occurred during the time that the mighty Russian Bear was steadily advancing toward the German frontier. All the hidden terror of Russia, which could not be conveyed directly, was implied in this rumor. When people are not allowed to express their fears openly, their minds find other byways to get rid of its tension. By displacement their horrors become concentrated on other subjects. The amount of silly anxiety-provoking rumors circulating in a community may be a good indicator of the morale of the group.

Every study of morale must take into account those hidden manifestations of personal fear and collective fear.

4. The Breaking Point and the Capacity for Frustration

What is the straw that breaks the camel's back? This is a key question in the problem of personal morale. During the Second World War, I treated a fighter pilot who was unafraid of his dangerous work, but who felt unhappy about his personal relationships. Suddenly during an air raid alert in London, where he was on furlough, he was struck by utter panic. In normal life he had been a rather shy and withdrawn young man. Unexpectedly finding himself in a shelter, with a frightened group about him, he had been contaminated by the fear of other people. The strange situation found him unprepared to put up his inner defenses, and so he broke down.

No one can really tell how he will behave in times of greatest danger. The true test of reality will be solved in different ways. Many will accept the challenge. Some overdefensive, compulsive individuals will even welcome the test of reality. Still others—who were already unstable—will misuse the new situation as an excuse to break down and let their emotions go.

In psychology we are aware of the fact that there are two determining groups in this mental breakdown: one with long-term factors causing a gradual breakdown of defenses, and one with short-term factors, the so-called triggers or provoking factors suddenly causing a collapse of the mental and physical integration. To the first group may belong chronic disease or the many chronic irritations of life. The second group is known through its sudden, symbolic impact on hidden sensitivities. The mouse appearing in a girls' class does not arouse panic because of its objective danger.

Modern psychopathology has developed quite some knowledge about the manifold sensitizing traumata experienced in early life which make people subject to such unknown trigger reactions.

Yet, trauma and frustration are too much looked upon as weakening components in the buildup of the personality. As a matter of fact the opposite is true. Challenge and resistance make the personality. Coleman, Shor and myself (8, 33) have repeatedly shown that in order to develop greater inner strength and better ego defenses, the individual has to traumatize himself in order to become stronger. What else is "fair" sport and "fair" competition but a repeated training in morale? The self-traumatization by trial and error is part of a spontaneous effort toward a self-discipline. But when the person cannot find strength in himself, he must borrow it from his neighbor and look for strength by proxy. Too great emphasis on dependence or leadership increases this proxy mechanism. Leadership is not exclusively the secret of morale. Identification with the leader may sometimes fortify the person's inner strength, but it may also frustrate his capacity to grapple with his own problems. A frustrating leader may decrease our capacity to tolerate frustration.

Living under too soft circumstances implies a weakening factor, and a recent publication (41) on experiences with men under combat stress and with rats in the laboratory has proven that luxury in general influences man's capacity to endure.

Somewhere good morale means no longer being afraid to die, having solved that mythological anxiety about death being something dark and obscure, and the willingness to accept fate. Accepting fate and duty and responsibility is living in a different way. It means moral courage to stand for moral principles which you have gathered in your life, and without which life is not worth living.

Suggested negative expectations often exert a strange influence on the will to resist in a group. The bad anticipation paralyzes. If one expects people to break down, they may either give in more easily to those false prophets or, out of hostility, feel boosted in their morale. The press, the radio, television have to be aware of their subtle responsibility as morale-influencing mediums.

It is important to realize that mental prophets expect more panic in others when they themselves feel jittery and insecure. In the last war, there were many sensational forecasts of panic that, happily enough, did not materialize—such as Dunkerque. Man is often mentally much stronger than we expect him to be. Of all the animals, he can suffer most and take danger best—provided he does not weaken himself by his belief in supernatural terror stories nor become unnerved in a cold war.

Scheme of Factors that Determine Individual Morale

What causes the breakdown of defenses?

What is the straw that breaks the camel's back?

Long-time factor; provoking trigger.

The pre-catastrophic attitude towards danger and stress (The existing neurotic patterns)

- There are many means to ward off fear and anxiety (see other chapter).
- The initial shock and depersonalization have various impacts.
- Contrast between self-preservatory instincts and adaptive mechanisms and the preservation of the group.

The interplay between external and internal dangers

- The role of sensitizing internal horrors especially investigated by psychoanalysis.
- Inner discipline and control mean control of instincts; suppression without repression.
- Internal control dependent on adequate identification with:

parents	Training in discipline
teachers	Training in consistency
the group	Training in endurance
the leader	

Physical factors. Different thresholds, dependent on constitution and training.

- Physical challenge may stimulate or paralyze.
- General stress symptoms are:

With many individual differences	Shortage of leukocytes (to 20% of norm)
	Dehydration
	Loss of appetite
	Increased systolic pressure
	Temporary exhaustion of adrenal system
	Lengthy recovery (5–12 days)

The degree of anticipation and mobilization which may be pathological or not.

- The willingness to endure and to accept fate.
- The amount of self-chosen experiments with dangers leading to fortitude and greater adjustment potential.

The inner coherence and the system of ego defenses

- Control of the unconscious.
- The ability to learn from experience and to accept challenge.

Compulsive type	Isolation of rigid defenses, sometimes protective, sometimes a handicap.
	The perfectionist has a limited morale.

Narcissistic type—uses every stress to regress.

The fear fetichist—feels himself a continual prey of circumstances.
Paranoiac and latent homosexual type.
Psychopathic type { Being carried away by fanaticizing impulses and illusions.

The paradoxical breakdown—fear-incubation, collapse as after-effect.
Combat soldiers broke down not in the zone of stress but afterwards.
Liberation reactions.
Building up of defenses needs time.

The strength of the superego, of moral values living in the individual
Too much guilt may lead to early breakdown.
There is an inverse relation between *integrity* and *free-floating anxiety*.
Only he who checks his fears and anxieties can be a well-integrated figure.

The degree of allowed activities (the problem of man's occupation and leisure).
Loneliness and inactivity shatter morale.
Helping others boosts morale.
Teaching increases morale more than being taught.
Aimlessness of action paralyzes.

The quality of the group and the leader
Morale by proxy { helping others / borrowing strength from others / morale contagion
The role of communication and identification.
Positive emotional stimuli in the group { being loved / being accepted / friendships
The amount of contagious fear in the group.
The amount of loneliness and rejection in the group (brainwashing).
The quality of interpersonal processes in the group; conscious and unconscious exchange, floating transferences, resistance-provoking qualities, scapegoatism.
The quality of the leader and his uncertainties and ambivalences.

Various cultural patterns
The value attached to the individual—is the man the master or a tool?
The amount of suppression or repression the culture asks for (or fear-ridden conformity).
The fatalistic attitude imposed; e.g., the illusion of invulnerability (Mohammedanism, Harakiri).
The ideological strength, faith and values the culture gives (archaic and barbaric ideals—Third Reich).
The allegiance of the individual to the group (participation contra individualization).
The devaluation of moral standards.
The value and faith we invest in our institutions (the danger of the imposed order!).
The fantasies rampant about "the enemy".
The amount of terror and oppression by a minority.
The cultural lag (too highly civilized habits for our actual moral stature).

5. Morale and the Pre-catastrophic Attitude

The word morale has come to be associated particularly with periods of stress and danger, when people's real backbones are put to the test. When things are going along in a quiet normal way for the majority of the population, the newspapers seldom mention morale. However, even in such times, we might find good cause to speak of the morale of a minority group or of a small opposition party. That is because minorities are presumably under stress to maintain themselves. Yet, political victory as such may have a demoralizing effect since the stimulating fight and the need to show one's best side are no longer needed.

In times of stress and calamity, people begin to test each other's vulnerabilities and weaknesses. This is especially the case during a cold war with its continual attack on the morale of both sides. It is, of course, even more acute during a hot war.

However, in whatever sense we use the word, whether for the individual, the group as a whole, or the army, it always implies an inner choice between hard duty or mere concentration upon self-protection. Man must decide between accepting responsibility and fleeing from it.

Much of man's reaction will depend on his pre-catastrophic attitude toward stress and danger. There are many different means of anticipating and warding off fear and anxiety. Actual psychopathology is able to describe quite a hierarchy of such fear patterns. According to these pre-existing patterns, the initial stress and danger will have different impacts. Some may be pathological.

The false anticipation of danger is often more fear-arousing than the impact of the danger itself. The uncertainty of the moment of impact provokes fantasies of helplessness. In a war the bomber crew, during its long flight to the target, is in a state of continual tension and alert; yet there is only a short moment of battle action, and then the long flight back to base begins again. This is why we found more free-floating anxiety and increasing sensitivity to the impact of danger among bomber crews than among the more active fighter pilots dur ng the late war. The

fantasy about danger ahead is more paralyzing than facing an acute test.

The disastrous effect of prolonged and fantasied anticipation is made use of in the war of nerves. During uncertain anticipation, inner hell may break loose. The cold war centers its attacks largely on the morale of the weak. Its aim is to arouse a demoniacal mythology of eventual dangers and horrors. The amount of rumor and fantasy formation in a collectivity determines the steadfastness of its reaction to psychological attack by an enemy. The strategy of spreading terror in a cold war repeats those phases of fearful anticipation in the public until every inner bulwark against fear is broken down and the public surrenders to the idea of a strong dictatorial leader.

Much of such paralyzing anticipation will, as a matter of course, be dependent on the amount of adequate preparation and training. In this connection training again means a willingness to endure and to accept fate. Pampering children and soldiers will never fortify their morale. Happily enough, many children experiment of their own accord with self-chosen dangers, with difficult sport exercises and with horror stories in order to be ready and steady when the real tests of life begin.

Military training affords not only the mastering of military skill, but it also increases personal fortitude and endurance.

6. The Interplay Between External and Internal Dangers

Freud has directed our attention to the peculiar interplay between external and internal dangers. In man, the subjective dangers from within the depth of the person—from frustration, old feelings of guilt, archaic mythical horror fantasies—often make people much more vulnerable than the objective dangers threatening from outside. Indeed, in the last war we learned that the loss of love and affection and the breaking of family ties affected children more than the other destructive aspects of war. The evacuation of their homes, leaving their parents, disruption of their accustomed daily life—these things upset the children and often broke their morale. In neurotics we experience particularly the role of the internalized horrible fantasies originating in childhood, these hidden fantasies only coming to the fore in dreams and nightmares.

Objective, recognizable dangers, such as floods or even bombing, stimulate the psyche to become alert and to set up defenses. But imaginary or unseen dangers—such as caused by rumors—overshoot the mark; they imply greater uncertainty and stimulate the formation of neurotic defenses and fearful anticipations.

They cause man to be continually on the alert and so make him more vulnerable. Such inner fears are very often related to the fear of one's own repressed instinctual drives and to hidden feelings of hate, guilt and aggression. We so often meet neurotics who cannot face their tremendous hostility and who convert it into a constant state of panic and anxiety. In brainwashing, hidden guilt of this kind is used by the enemy to break down the morale of his victims. By threatening the victim's family, his friends and his buddies he appeals to that tremendous reservoir of unconscious feelings of guilt in man.

In our civilization a tense equilibrium is maintained between internal and external dangers. "Stop" and "Go" signs become confused since so much is artificial and so many diversified, confusing choices are left to the individual. Sometimes the dammed-up aggressive forces may burst out beyond all control even when there is no real danger. We experience this in the many forms of unexpected rage inspired by fear. Sometimes the danger from outside may be so very great that it tears through all our cultural defenses, and we break down. The primitive and helpless child in us awakens.

However, psychiatric experience leads us to believe that what often breaks man down is the already existing lack of inner stability and control although disaster may provoke and touch off such internal disturbances as we see in battle neuroses.

As an example of this, I want to mention again the pilot who during his furlough to town had been forced to hide in a shelter because there was an air alert. It was this unforeseen sojourn with panicky people (in a small shelter) with their contagious fear that had completely broken him. In the course of discussions with him, the fact emerged that various additional personal conflicts had brought him to his point of sudden breakdown. All these coincidental occurrences had

aroused deep, hidden fears which were apparently only slightly related to the real, acute danger of the moment.

Do not think that this is only a negative finding. Morale is somewhere related to the imprinted morale and experienced happiness during the early years at home. The internalized childhood experiences determine our actual capacity for endurance. Those who have happy memories to build on are stronger in life than those who reminisce childhood unhappiness. Being happy is an early conditioned inner art; it cannot easily be provoked from outside. Inner morale is largely determined by the number of happy memories we have to live on. These again are dependent on the parents, teachers and leaders with whom we can identify and the training in discipline, consistency and endurance which they provide for us.

For our purpose, to describe the manifold involvements in morale, it is important to realize that various inner factors may cause us to use external dangers as justification for breakdown. Our pilot walked around with an inner conflict for a long time. In his active work as a fighter pilot he could get rid of his rage. But being passively delivered to the anxiety of others was the last drop in his latent breakdown.

The weakling in us may use every outside danger to become a dependent, self-pitying child. Now and then everybody runs into a situation in which he finds that outside catastrophe only acts as a trigger or spark setting off hidden tensions and emotions so that they rise to the surface.

7. Some Physical Factors Behind Morale

To examine the science of stress reactions with all their various organ responses, would lead us far away from the problem of morale. Nevertheless, for the completeness of our survey, a few facts should be mentioned.

During recent years physical reactions to stress have been studied rather closely. They belong to the alarm systems of the body which we teleologically may explain as acute mobilization against eventual body harm. At the alert the body is ready for fight or flight. After this acute mobilization under the guidance of the pituitary and adrenal systems, and after the passing of the danger, there follows a chronic stress period ascribed to the temporary exhaustion of the adrenal system. In solidiers after combat stress there is usually found a shortage of leukocytes. Also dehydration, loss of appetite, increased systolic blood pressure are observed. It is important to know that the recovery of such an exhaustion syndrome takes time, usually from 5–12 days It is also of importance to know that reactions are different in various individuals. In some, physical challenge stimulates defenses; in others, the effect is paralyzing, dependent on constitution and training. Everybody has a different *threshold* for action of the physical alarm system and the consequent exhaustion reactions. Here we may find the somatic parallel with psychological morale.

An additional aspect of physical factors behind morale is the complicated question of people's attitude toward their body—their face, their clothes, their uniforms and their physical attractiveness. Tradition and superficial evaluation of beauty here play a tremendous role. However, we cannot deny that the industry of cosmetics and even plastic surgery maintain successfully that these aids serve to increase personal morale. Most of this, however, can be reduced not to physical factors but to incidental socio-psychological attitudes. On the one hand, these are created by whims of an epoch and may cause feelings of inferiority; on the other hand, people attempt to cure them by other equally whimsical means.

8. The Importance of the Actual Fantasies About Fear and Morale

One of my clearest memories of the Second World War is the difference in reactions between me and my friends, on the one hand, and a couple of German officers, on the other hand. The objective danger was the same for both parties. It happened in occupied Holland. My friend and I chanced to be playing tennis on a beautiful summer's day, while on the court next to us German officers were playing in white tennis clothes of the same kind.

Suddenly, out of a clear sky, a squadron of Allied Spitfires came over. My friends and I stopped playing and cheered spontaneously. But the officers on the next court ran away and threw themselves under a tree. Though the eventual objective danger was the same, for us the pilots were friends, for them the enemy.

A year later after escaping I reached London, and German planes flew over the city. At first I had the same "paranoid" feeling toward bombs that the German officers had had in Holland—"as if every bomb were meant for you." During the Second World War bombardments, the chance that people would be hit was statistically slight. Yet, one had to get used to taking this statistical risk.

In the same way that we have various fantasies about danger just striking us, or magically just bypassing us, we also have fantasies about how courageously we are expected to behave during the impact of danger. In the section on paradoxical reactions I will come back to that peculiar feeling of letdown when the danger is past. In giving first aid in catastrophies one can repeatedly observe how uncontrolled human reactions change when other observers enter the picture. Men who let themselves go hysterically suddenly stop when a girl comes in, and the question flares up in them: what will she think of us? In the treatment of battle neurosis we made use of this observation by letting women nurses take part in the treatment. In group therapy victims of panic repeatedly report that the question of how other people feel and judge about them plays an important part in determining how the patients react. Self-evaluation by proxy and the judging eye of the community keep our reactions under control.

9. Fear-Incubation and the Paradoxical Breakdown

Danger and fear do not provoke symptoms in man immediately unless the calamity is overwhelming. People are pretty well prepared for sudden dangers and catastrophes. Most people will act adequately and courageously in a sudden accident. Yet afterwards, the repressed acute fright and trembling remain active under the conscious level of the mind until they may suddenly come to the surface. Most of the time after a catastrophe there is no outward recognizable reaction in people, except for a few somatic defenses against danger. But in certain cases where gradually connection is made with hidden unconscious material—with childhood fears being revived by the catastrophal trigger—a real collapse in the form of an acute anxiety neurosis or psychosis may occur. After the German bombardment of Rotterdam in 1940—where there had been no immediate panic among the population—we experienced an outbreak of nervous breakdowns and typical nearly psychotic fear reactions coming up months after the catastrophe. Fear has an incubation period, different for various people, but it often takes months to reach the explosive layers of the psyche.

To the therapist, fear incubation is important in his planning for first aid in catastrophe. After acute dangers and catastrophes such as bombing or flooding, we have to be sure to treat the jittery, panicky victims as soon as possible. Through sufficient mental first aid behind the battle line and eventual further treatment, we can prevent the "underground" connection with older, troublesome, emotional material. From military experience we know that battle neuroses become fixed and much more difficult to treat if they are not treated as soon as possible.

However, it is not always the danger itself which arouses fear reactions and nervous breakdown—it may be the halting of danger. During a period of trials and tribulations, people are frequently tense but self-composed. Then suddenly, after the danger and tension have passed, the situation permits them to let themselves go and to become like helpless, crying children. A good example of this occurred in Dover, England, in 1944, where a general "nervous flop" of the population took place. This happened after four years of daily shooting and war tension were terminated by the Allied armies after they had cleared the opposite Belgian coast of the enemies who had been firing on the town. The years of tension were lived through very courageously. The liberation from fear and tension brought temporary loss of morale.

In every breakdown the permission to break down plays a role. The permissive onlooker and benevolent judge play a role in this process of letting defenses down. The sadistic enemy in the concentration camp prevented such a breakdown; it was amazing how few psychotic and neurotic reactions were observed during that period. But here too the reaction came afterwards.

The same breakdown of morale may occur in

a victorious army which is no longer prepared for action. Napoleon experienced this after the battle of Jena, where a sudden rumor of an approaching fresh enemy aroused panic.

This paradoxical loss of morale always occurs when there is no need to behave well any more. We encountered it in many people of the occupied countries after the liberation from their tribulations. Now, after years of tense self-control, they were allowed to let themselves "fly off the handle". Temporarily things had to be expressed in rage. The formerly useful repression of piled-up rages has to be acted out now. Frankl (15) compares this with caisson disease that breaks out after the pressure is lifted.

There also exists in men an active search for panic, a search for an opportunity for a temporary loss of control. After having been composed and courageous for a long time, a man wants to relax from the extra exertion. the libido in us wants to rage without restraint. The baby in us wants to be taken up and coddled. The soldier wants only to sleep for a few days in order to be ready for new courage.

10. Inner Coherence and the System of Ego Defenses

A study on morale is not the place to handle all the intricacies of the difficult problem of ego and ego strength. In short, we may say that the system of inner defense formations during one's lifetime will determine whether or not circumstances will break a person down. Here again we meet the ambiguity latent in the concept. Sometimes an inner defense will be useful; sometimes a wrong rigid defense will lead to earlier downfall. The mind also has its Maginot Lines.

The concept of ego itself is a herkological one; it indicates the frustration tolerance our psychological structure has. The words *ego* and *ego strength* may be confusing because they are structural concepts dealing with patterns and their distortions and not with physical strength as such.

Our ego defenses form, as it were, a double barrier on the one side against the upcoming inner drives, which have to be constantly controlled and checked, and on the other side against the intrusion of stimuli from the environment. They are instinct barriers and pain barriers. They ward off drive and passion and the overwhelming by too much communication. They help to control and to isolate the person amid his own frontiers. They may allow partial or disguised gratification of inner needs and tendencies and also select the useful stimulations from an outside world.

In relation to our subject of morale and inner fortitude it is best to describe its relation to ego defenses from the herkological approach, asking ourselves what ego defenses may be a liability to a person's inner strength. I can only mention a few of the various ways in which ego defenses against danger are used:

Paradoxical reaction formation. Under the influence of pressure training, repressed drives may be expressed by compulsive repetition of opposite attitudes. It is, for instance, known that extreme cleanliness can become the rigid defense against confused sexual urges or aggressive tendencies.

Such a system of compulsive defenses holds out adequately under the usual circumstances (though it increases the risk of psychosomatic diseases). Yet, under abnormal pressure such as bombing, infectious disease, poverty or alcoholism—such defenses break down very easily.

Denial. We may compare this defense with blind escapism. The person acts as if special aspects of reality do not exist. In the face of danger, all kinds of emergency patterns will be ignored, and passive surrender to the catastrophe may take place.

Identification with the agressor. A masochistic identification with the feared person or object takes place. The enemy is not fought against but instead is joined. In the concentration camps this masochistic pact with and surrender to the torturer was often observed as a tremendous self-destructive mechanism. This masochistic surrender is the secret of the false confession under brainwashing.

Regression. This mechanism of defense implies a complete loss of acquired and trained adjustment patterns. Facing danger here means a falling back to early infantile attitudes, helplessness and an uncoordinated battle as if every useful means of resistance were exhausted. Under these regressive mechanisms I may mention utter apathy, the

cataleptic death-attitude and suicide. For a more extended study of these defense mechanisms I would refer you to the corresponding literature (12).

Let us now look closely at the personality as a whole. Between unconscious drives and influences from outside, a central mediator, for practical purposes called the ego, gradually develops. For our purpose it is enough to know that this intrapsychic steering and maneuvering entity gradually tries to gain control over the instinctual drives arising from inside, and the forces working from the outside world on the body-mind unit. Psychoanalysis tends to equate morale with ego strength. Adequate control of the unconscious is attained and agile ability to learn from experience and to accept challenge.

Clinically, we experience that different individuals—as a result of their life experiences—develop the different ego defenses, as previously described, preparing them for different reactions to the challenges of life.

From military experiences we know that a certain type of frustrated recruit who does not know how to handle his own aggressiveness and who has covered it up with, for instance, an utter pacifistic theory, easily breaks down when confronted with weapons. His initial training arouses the fear of letting himself go and shooting all his buddies. Another soldier who does not know how to cope with his own problems, and who is easily disgruntled and thrown into a rage, is dangerous not only to himself but also has a bad influence on the morale of his unit. His tension and continual state of alertness are communicated to the group and make everyone less tolerant of outside irritation. Self-control is needed in cold and hot war alike. People become more vulnerable and less self-confident in proportion to the amount of rage and anxiety that is too easily aroused within them.

Among the types leading to different reactions to a challenge of life we may distinguish the following:

The compulsive type, the perfectionist with a limited morale. Because of his isolated and rigid defenses he is only prepared for special life associations. His automatic defenses actually form a handicap in unfamiliar situations.

The narcissistic type will use every stress to regress to his yearned-for infantile dependency.

The fear-fetishist, who feels himself a continual prey of circumstances, not only collapses under the real test of reality, but then wallows even more in the masochistic delight of his anxiety. He carries a file system overfilled with fearful anticipations helpful in his strategy to manipulate the world with his panic.

The psychopathic type is continually carried away by fanaticizing impulses and illusions. He never sees the reality of danger and its impact but regards them as tools for his private aims.

The paranoiac type lives in constant fear of persecution. He had been too much aware of intrigue and insinuation and devious ways of underground aggression and could never put up enough humor or adequate defenses. He has, as it were, been waiting for the enemy all his life. He is especially dangerous for the morale because he mobilizes all the latent suspicion, mutual distrust and hostilities in people. Sometimes we find that the external danger fits well into such an old, morbid expectation.

Other egocentric types of people who experience every outward challenge as a personal offense will also break down. These are only a few of many examples that could be given.

Often it is the amount of initial hidden panic in life that determines what will burst out later. Panic in childhood may cause collapse of morale later on. I admit, there are many symbolic attacks on morale, by word or deed, touching deeply hidden complexes. A personal insult may initiate panic; travelling through unfamiliar environments may cause a breakdown and reveal our infantile dependency need. Emigration, flying, shooting, even leisure time may touch off hidden fears in people. The absence of the usual social and mental stimuli —as we experience in prisons—may arouse fears that were repressed for a long time. Social isolation makes all our latent fears go on a rampage. Ego psychology will teach us gradually more and more about the buildup of mental fortitude and personal morale.

11. The Strength of the Superego and Moral Values

Over and again at various points in this survey I could cite instances of inner guilt

being able to break down people's morale. The methods of brainwashing and enforced confession particularly make use of this conscious or unconscious feeling in order to stimulate the compulsion to confess and to submit to authority. Too many guilt feelings may lead to early breakdown, for there exists in many people, as it were, a continual waiting for the ulterior punishment by calamity. The church knows so well how a clear conscience brings fortitude to men.

In general we may say that there is an inverse relation between mental integrity and free-floating anxiety. Those who are always on the alert lest somebody see their mistakes and failures are lacking in backbone. Only he who checks his fears and anxieties can be a well integrated figure.

Our experiences under marginal circumstances during the Second World War proved that there were three influences under which the unbearable became tolerable. In the first place one must have faith, simple faith in religious or ethical values, faith in humanity, faith in one's own goals. In the second place, there must be awareness (in spite of the temporary disaster) of one's acceptance by others, through group formation and friendship, or the knowledge that somewhere on earth our beloved one is waiting for us. In the third place, there must be some understanding, not sophisticated knowledge but simple psychological understanding, about motivations of the enemy and his deluded drives.

Several psychologists told me how under these frightful circumstances they felt carried by their science. Science and insight gave them perspective and made it possible to see their own suffering from a greater distance. It was this philosophical attitude of the inquisitive mind that fortified their morale. For me personally it was one of the great stimulators which helped me to endure.

12. Morale and Man's Occupation and Leisure

It is not my intention to give any survey of the psychology of man's occupation and the use of his leisure time. There exists a growing body of knowledge studied by industrial psychologists and those psychoanalysts who are especially interested in the problem of work. For our purpose, it is sufficient to call attention to special points—though the whole subject of man's occupation has tremendous influence on his personal and collective morale.

Going back to military experience, we found that being busy and being urged to exercise and train in technical patterns (of which every soldier knew the rationale) was the best booster of the morale of the troops. Purposeful activity raises morale; loneliness and fruitless inactivity shatter morale. Active teaching increases morale more than being taught. Helping others lifts morale; it increases one's value in his own mind and in the eyes of others. Aimlessness of action paralyzes. Not defeat in itself but the feeling of confusion regarding the leaders and their over-all strategy break down the spirit.

Every worker in some way aims at self-appreciation and appreciation by others. Every piece of genuine work has a practical aim and a purpose involving prestige and human relations. During an investigation of the motivations for self-appreciation and pleasure in work (51) there was found that especially the sexual mate and her appreciation of her partner and his prestige were among the strongest motivations. She carried part of his self-evaluation.

Our age of technical improvement, we found, created new problems in relation to man's morale. It is not only his work and creativity that determine man's self-confidence. His greater amount of leisure time has acquired a new impact on his mental life. Drinking, artificial ecstasy, creative hobbies, passive pleasures in the theater or for the T.V. screen—all these bring to mind a thousand suggestions, fortifying man's morale or making him more passive. In regard to the television screen, I only call attention to the confusing influence it may have where people unwittingly are conditioned to become passive peepers and listeners and thus wearing out the zest and inner activity man needs to become a stronger personality.

Future educational psychology will teach us more and more about the various circumstances by which ego strength and inner fortitude can be better cultivated unless the pattern of general conformity becomes the ideal of our culture.

13. The Quality of the Group and the Influence of the Leader

In every group situation morale refers to the degree of cohesive strength of the members and to the amount of loyalty toward the group and its goals. Morale may, or may not, imply an *understanding* of the goals. In Western culture a much deeper need for awareness, understanding and consideration of goals is implied than is called for in a totalitarian state.

In the totalitarian state with its imprinted veneration for the strong leader, the threatening loss of coherence—when the dictator or leading group fails—would have a much more disintegrating effect than such failure in a democratic society, whose members usually have reached a higher degree of self-determination and governmental skill. A democracy always finds new leaders ready to take responsibility.

We have already seen that morale includes the question of how much people can endure physically and mentally, and for how long. Under different kinds of regimentation the limit of endurance will be different. "Stand-by" morale, based on fear, as in prisons, may disintegrate at the least sign of weakness in leader or guard, or when the individuals have not as yet been sufficiently indoctrinated with the discipline expected.

The kamikazes, the pilots educated for suicide, were thoroughly indoctrinated with the self-offering ideology; and their morale, as shown in the late war with Japan, might be said to have been high—in an Oriental sense. Here discipline and allegiance had become so automatic that life was of no importance either to the individual or to the group. The only thought was to keep going and beat the enemy. This kind of morale is often dependent on obtaining a frenzied desperation—a kind of collective suicidal rage—in pursuit of the national goal.

Now we are becoming more and more aware of how important leadership is in boosting morale. The leader is the embodiment of the multitude of valued human relationships for which we are willing to offer our energy and even, when needed, our lives. Through identification with him we borrow his fortitude. It is not always the official leader who has charge of lifting the morale. Sometimes a sergeant or a soldier—though recognizing the intellectual and official qualities of the officer—may take over this function. During the second World War several spirited buddies became the inspiring mascots of their platoon.

The official leader himself is in a more difficult position. He must be many things that may seem to contradict one another—he must represent the paternal authority, as well as our ego, our conscience, and our ideals. He must relieve us of our sense of guilt and anxiety, and he must be able to absorb our needs for strength, affection, and dedication—our transference needs as expressed in psychological terms. He must be able to create group action and motivation and at the same time increase the individual's self-esteem. His doubts may become our doubts. At times we may want him to be a tyrant, so we can be relieved of our personal resentments and responsibilities. Sometimes we want to compete with him as we competed with our fathers. At other times we want affection from him. The leader must serve both as a scapegoat and as a giant.

In a democratic regime the central leader is a lonely man because he is the meeting point of many different feelings which are transferred to him. We have various contrasting feelings toward him, but we need him to direct our common action. Later, if necessary, we can vote him out of office and select a new leader.

Our own inner strength will grow, depending on his inspiring and leading personality. While we may never love him completely, we will use him to grow or decline in our morale.

Yet the individual not only borrows strength from the group, he also brings his own spirit to it. Even when he is used as a scapegoat to release group hostility, the individual—when he takes it with humor and philosophy—may unwittingly boost the morale of the group. He communicates, as it were, his personal tolerance to others. The black sheep in a platoon is often as much accepted as the beloved sports hero.

In the same way the group communicates all kinds of feelings to the individual: the process of *morale contagion* is continuously going on, its quality depends on mutural acceptance, friendships, the amount of contagious fear in

the group, the quality of interpersonal processes, resistance-provoking qualities in the few, and so on.

Let us not forget that the best morale booster for ourselves is to help to lift the morale of others. When this interhuman contact is not allowed, morale is soon lacking. For instance, we learned from several escaped persons from behind the iron curtain that the most prominent complaint in the totalitarian system was the moral isolation. The individual feels alone and continually on the alert. There is only mutual suspicion. The new gospel for those escapees was the ready humane acceptance they experienced in the "democratic" group. Here were spontaneous enthusiasm and mutual acceptance—even when there was disagreement.

Enumeration of factors influencing group morale

The following factors resulting mostly from military experience may endanger morale:

1. Wrong anticipation of danger. Myths and rumors about the enemy.
2. Severe stress. Battle fatigue.
3. Bad physical and mental health (flu!).
4. Lack of food, lack of sleep; cold and dirt.
5. Bad leadership.
6. Bad training. Lack of skill. Overtraining.
7. Poor communication and poor information.
8. Destruction of basic values, lack of faith.
9. Confusion of activities, strife in politics, bad selection of government.
10. Authoritarian and undemocratic behavior. Humiliation.
11. Tyranny, too rigid discipline, but also lack of discipline.
12. Homesickness and feelings of estrangement.
13. Internal hostilities, prejudices, persecution of minorities.
14. Thought-control and menticide. No right to be an individual, no justice, no right to appeal.
15. No function, no function in the social setting, no duties.
16. Alcohol and sedatives.

The following factors may boost morale:

1. Sound democratic leadership.
2. Well-planned organization with the freedom of improvization. Minimum of red tape.
3. Democratic self-discipline. Do we have faith in our own institutions?
4. Information and unhampered communication.
5. Freedom of religion and moral integrity.
6. Mutual loyalty and mature responsibility; team spirit.
7. Mental alertness. The important psychology of awareness of the problems of our own epoch.
8. A sense of belonging and being accepted.
9. A sense of justice, freedom and privacy.
10. Confidence in experts ready to give first aid (Mental Hygiene, Clergy, Red Cross, Civil Defense, Medical First Aid).

14. Culture and Morale

Cultural tradition also determines the meaning of morale. The concept of morale is different within different cultural groups. In Eastern societies with their pattern of participation—where the well-being of the group is more highly valued than that of each individual—emphasis is placed on conforming behavior and being entirely subordinate to group habits and discipline, even to the point of total submissiveness.

This contrasts with Western culture where, for the most part, the ideal of individual freedom and personal responsibility prevails. In societies of this kind, ego strength and individual morale acquire special value: they afford social discipline and there is a more limited need for conformity.

On the other hand, our industrial revolution disturbed the feeling of "belonging somewhere", a feeling so much needed for keeping up our morale. The need for privacy can come in conflict with feelings of loneliness. Man wants to express himself, but not at the cost of being closed off. He wants to be rooted in a culture, yet he does not want to be caught by it. He wants to be in constant communication, yet he wants to keep up his reservedness and privacy. Different cultural patterns will influence this in different ways.

It is impossible even to attempt to give a survey of the multi-various cultural patterns

influencing personal morale; I can only indicate a view. Nevertheless, this very subject is especially related to the tremendous aggressive clashes in our world.

Morale will be different in a culture where different values are attached to the individual. Is man the master or a tool?

The amount of suppression or repression the culture requires will determine the range of inner conflicts of the individual. What does he have to do? To fit into a pattern of fear-ridden conformity, or to carry the burden of personal conscience and of being a personality?

A fatalistic faith combined with the illusion of invulnerability (Mohammedanism, Harakiri) will more readily direct our actions along catastrophic lines. The law of Karma and Reincarnation, however, will increase the hesitation imposed by personal responsibility.

Some cultures will provide ideological strength and religious faith; others, archaic demoralization and barbaric goals (Third Reich).

The allegiance of the individual to the group is different in many cultures and in a participation culture is less complicated than in a more individualizing culture.

In a declining civilization with devaluation of moral standards the morale will be low. The value and faith we invest in our institutions are partly dependent on our acceptance of ethical standards. Yet an imposed order weakens morale.

Much of the morale and fortitude will depend on the amount of terror and oppression meted out by a minority or a majority and the fantasies rampant about internal or external enemies.

It may be that actually the standards and habits of the culture may be too high for people's moral comprehension; a cultural lag weakens morale. This leads us to the problem of *pseudo-morale*, the hidden emptiness behind official show of strength. In totalitarian countries man's innate gregariousness is often misued to lead him to hold gigantic meetings and parades in order to show off strength to the outside world and to check internal tensions. Enthusiasm is not spontaneous here but ordered from the dictatorial seat. Yet the pattern of enforced conformity continually lends feelings of strength to the individual. When he feels at home in the network of totalitarian rules, he is carried by it from the cradle to the grave.

One or two factors which influence the vulnerability of special collective groupings must be mentioned. There exist peculiar racial factors, combined with physical toughness, that make a man much more apt to adapt himself to difficult circumstances.

I cannot help thinking of the way in which the Chinese and Hindustani workers in tropical colonies have been able to adapt themselves better than white people to the initial minimum standards of life. Yet gradually, because of their greater morale and group discipline, they have worked and trained themselves up to a point where they have risen to the highest income brackets of those countries.

During the last war, by studying statistics of treatments given for head and brain injuries in the Soviet Army, we were amazed to find how great the physical toughness of the Soviet soldier was and how short was the period from injury to cure.

On the other hand, we have to be aware of the fact that soldiers coming from a culture with too luxurious a pattern of life, or from homes where they have been too pampered and protected, lack the stamina and resistance needed for the harsh and lonely circumstances of war.

The same may be true in relation to the greater vulnerability of towns. A community built in large dimensions, where people take care of heating and water in individual homes, will be much less vulnerable to bombing than a metropolis having a concentration of population and luxurious gadgets. In such a city, the mere cutting off of electricity will stop more than half of the heating systems and nearly all of the elevators. Technical luxuries can make for greater vulnerability.

These are only a few examples to prove how morale and vulnerability are dependent on several environmental factors.

15. The Need to Collapse

Although in psychopathology there exist many sophisticated terms for the wish to succumb to mental pressure, such as death-wish, the wish to regress, masochism, depend-

ency-need and many others, for our purpose it is sufficient to state that there is in everybody a tendency not to be himself, not to be anybody, not to resist mental pressure. It is the need not to be conspicuous and to disappear in the masses. Especially when there is no awareness of any sense and meaning in the catastrophic situation, when there is danger of tremendous things happening that go beyond understanding, the wish to collapse and to let go is easily provoked. We heard this from so many victims who entered the concentration camps with the unanswered question: "Why did all this happen to us?" Why? Why? Their need for sense and purpose and meaning in life was left unsatisfied, hence they could not keep up their personality. Out of defense against the irrationality, they had to let themselves go in what psychopathology calls a depersonalization syndrome: a general feeling of having lost complete control of themselves: of one's own self and one's own existence. "For what?" they ask. "What is the meaning of all this resisting and suffering?" And gradually they sink dully into a state of semi-oblivion.

During my own escape from Nazi hands I never lost my bearings until I arrived in Switzerland; and there, in what I thought to be a friendly country, I was beaten in the prison. The unexpectedness and illogic of this struck me down. Only those prisoners who found an answer, philosophical or psychological, could find the power to endure the circumstances. *Morale connotates an inner emotional question.* Only when people know "why" they live, do they find the answer "how" to live. The philosophical question often goes beyond the material question under those marginal circumstances of life. *Inner morale and fortitude ask for sense and meaning in the world;* they want to look into the future; otherwise the ego collapses and does not want to exist any more. We often forget how important it is for people to be useful, to be appreciated and valued in their work. The moment people are not allowed to take part in work that is useful and has meaning, they refuse to exist, they become indifferent, apathetic, without interest, and they retreat into a state of hibernation.

Several inner processes occur in such a collapse or breakdown. The collapse may be a pseudo-collapse, a temporary retreat into fantasy, a denial of the actual situation, a defiance of the bad circumstances and a denial of defeat. Yet, I have also seen people who were able to live under extreme stress without this denial of reality. They accepted the concentration camp and the persecution as a challenge to their mind. Physical pain did not hurt them. The exceptional circumstances stimulated their spirit. They lived beyond the circumstances. Some psychologists may call this a form of masochistic fulfillment, but this is a too limited and debunking approach to the problem of endurance. Their morale inspired others; they lived by fortifying and helping other minds. They carried on as a living proof that the mind is stronger than the body.

Yet, most victims could not live without hope and anticipation. They could not accept marginal fate, they were not educated with the acceptance of danger in life; with the Spinozistic "amor fati". The moment they saw no future ahead in their lives, they surrendered and became ill. In the camps several psychologists repeatedly witnessed such mass collapse when fantasied expectations were not fulfilled. The rumor was "At Christmas we will be free", and when Christmas came without liberation, many became ill because of too great disappointment. False anticipation became a paralyzing and killing factor.

The whole history of mass-movements is full of the *paralyzing idea* (3) of the passive panicky expectation and general feeling of malaise that haunts the people. The feeling of almost permanent pending disaster makes it more difficult to look hopefully forward to the future. "We are now conditioned to live with the superb madness of almost constant preparation for mass-destruction." (46). It is this latent panic that may lead us into the glamor of fantasy of inner betrayal, persecution and subversion, increasing the fear and consequent apathy and paralysis, seducing us in a continual flight from reality.

During the Nazi occupation we had to battle against those people possessed by fear in such a way that they wanted to be killed by the enemy. They chose the resistance movement as a place to destroy themselves and their fears but, of course, dragged other people with them into the claws of the enemy.

Their deluded fiction of becoming a hero was a dangerous one. They sacrificed other people in their indulgence of their disguised weakness.

Under those marginal circumstances we could experience that many people acquired a *backbone by proxy*. The moment that they could borrow strength from one friend who accepted the challenge of the moment, they were willing to do the same. The need to identify with a courageous leader (parental figure) suddenly changed their picture of self-confidence. Here we witnessed the tremendous influence of the one spirited leader, changing the morale of all.

The Nazis were very much aware of the existence of such unbendable heroes whose faith and faces could not be changed. They called those stubborn-willed characters people with "physiognomic insubordination", and they tried to kill them immediately after discovery. Happily enough the Nazis had many a blind spot for such spiritual greatness.

16. Menticide: the Strategy of Breaking Down Morale

The knowledge that human beings and their minds can be influenced, conditioned and broken down according to plan is much older than the modern dictatorial concept of brain-washing and enforced indoctrination. From time immemorial man has used awe-inspiring ritual, frightening masks and loud noises in order to compel and to manipulate the minds of his fellow men.

Methods to imprint indoctrinations on the minds of heretics or subversives or to provoke special confessions are not new either. The rack and torture are age-old instruments not only in the hands of primitive judges, but also of dictators and tyrants wanting to establish thought-control. When we study old reports of the Inquisition and the many trials of witches, we become well acquainted with these ancient methods.

For knowledge of the modern development of mental torture, we have to keep in mind that the rack and the burning pile were not only meant to torture the victim but more so the empathy of the bystanders, the general public, who identified with the victim. Physical and mental torture blackmail man's empathy; often the powerless onlooker suffers more than the victim tortured into anesthesia. Euphemistically, the dictatorial strategist speaks of the preventive action of such torture. Yet, it made terror widespread. The same may be said regarding the Moscow trials of 1936, where the old Communist Party cronies were forced to accuse themselves of high treason.

As to the actual strategy of terror we may say that the growing body of psychological knowledge has given tyrants new means of torture both physical and mental. We have learned that the mental weapon of instilling fear is most important. Every hero can tolerate physical torture—it often increases his resistance; but instilling of well-directed fears and anxieties breaks everyone down in the end. Such terror may be especially applied toward influencing the general public in the political field. Every form of human communication may be called on and misused in order to terrorize people and to attack their "deviationism" and private opinions. Rumor, propaganda, fright, big lies, slogans, distortions or subtle suggestions are organized into a well-planned verbal attack on people to keep them in a constant state of awe and growing submission to the "strong men" in government.

The public is looked upon as a laboratory animal that can be trained, conditioned or deconditioned by repetition of simple, emotional stimuli, as Pavlovian students do with dogs. Constant verbal intimidation of the public is a recognized method of totalitarian strategy. Hitler did it first through alarming headlines, later through street terror organized by his hoodlums, the Storm troops, till he got absolute power into his hands. In a "document on terror" Communist strategists describe their thorough methods of intimidation. The people are not to be aware of what is really happening. The Communists called this first attack on the morale "enlightened terror"; Hitler, his "psychological artillery". To fifth columnists fell the task of spreading rumors and provoking fear, confusion and cynicism. Hitler knew about the alarming or hypnotizing effects of slogans, that people can be lulled by big lies into an uncritical attitude. Spreading unrest would gradually paralyze intelligent public opinion. He inculcated people with the dread of war and treason, thus creating a greater dependency need. After the first attack on the

people's mind, you have to give them a period of rest so that they will forget and neglect their critical defenses. After such a lull of seemingly political peace, new waves of terror have to follow, the second causing an easier impact and fright because people are still upset by past experiences. Every new breathing spell can be shorter and shorter in this psychological cat and mouse play.

In case an individual has to be forcibly conditioned into an acceptable pattern of behavior there is the isolation of prison; and hunger will break nearly everybody down. There are daily nerve-racking interviews under painful lights while the prisoner stands erect to the breaking point. Physical torture is not needed and may even kill the human instrument the tyrant wants to use. In the final phase of mental torture, narcotic drugs may be used to bring a person to complete submission. There are only a few persons whose morale is so strong that they succumb physically before giving in mentally. Provided they understand exactly the strategy of the enemy, they can stand the mental pressure.

In former studies I called attention to such a dangerous form of thought control and attack on the free mind, terming this type of attack *menticide*. This strategy of menticide, also called mental coercion or brainwashing, is used not only against prisoners of war but even more against conquered satellites and against non-conforming members of totalitarian society.

The techniques of such terror that parades as "justice" in totalitarian states arose with the development of civilization and were perfected by the Inquisition in the Middle Ages. The science of third degree and forcible suggestion known as menticide comprises an organized system of psychological intervention and judicial perversion, in which a powerful tyrant (or tyrannical group) synthetically injects his own thoughts and words into the minds and mouths of the victims he plans to use as a tool or to destroy by, e.g., mock trial.

Mental browbeating of the individual may develop into a new terrorising approach toward communities everywhere where there is no system of democratic checks and controls to protect individual morale and liberty. In modern China students of totalitarianism frequently must read their own diaries aloud in the group. In this exposure of themselves they are forced to give their inner thoughts and can thus be attacked. This process of mutual "brainwashing" is the apotheosis of submission through self-accusation. In such a system, the right to have an individual ego and individual conscience is denied. For the masses the same kind of conditioning is organized: browbeating, bullying, group confession, self-accusation, meetings with long, boring lectures. Such a form of collectivism paralyzes any individual opinion and morale. All this is organized in the service of submission of the mind of the individual in a world where dissent or being yourself is the greatest crime.

17. Some Factors Endangering Morale

In psychological situations, it is often easier to say what is bad than what is good for something. The limitations of human endeavor are often clearer to us than man's progression.

We do know various elements that endanger individual and collective morale. Let me mention just a few as we experienced them in the army. False anticipation of danger—a badly informed and unprepared army or population is full of fears which find expression in the most fantastic rumors. Poor information creates feelings of uncertainty and apathy. Let us not forget that information and communication signify not only "news" but are tokens of belonging together.

Lack of sleep, or hunger and cold will have some influence but also morale-boosting capacities; that is why food is so important in first aid in panics. Bad leadership—confused, uncompromising leaders who themselves may be panicky—weakens the morale of the group. In a culture patterned on hygiene, unhygienic circumstances can have devastating action on the mood of soldiers. The prisoners in Korea complained most about the irritating insects.

Sometimes lack of a definitive discipline upsets the young soldier by placing too much responsibility on him. Young soldiers need strong paternal attitudes and guidance. Here often their ambivalent attitude towards paternal figures comes to the fore. They will scold their "cruel" officers but go through hell for them. The same morale weakening factors

may be found when there is lack of discipline in an eventual plan for civilian defense.

The use of sedatives usually breaks down ego strength and the will to resist. Alcohol, especially in times of stress, is the worst stimulator of morale. People under stress often respond pathologically to alcohol. The best stimulators after a catastrophe were found to be cigarettes and food—coffee and hot soup.

In describing what further stimulates good morale, we come to theoretical and practical difficulties because the positive aspects of morale are more difficult to formulate than the negative ones. Nevertheless, I will mention a few stimuli. Good morale is stimulated by good, democratic leadership provided by leaders who represent our ideals and to whom we can trustfully transfer our needs. Yet such leadership implies that there must be discipline.

If we care for our form of free democratic government, we must believe in its soundness and have faith in it. There must be mutual loyalty, friendship, and mature responsibility. To the extent to which we have conquered our ambiguous attitudes toward parental figures, to that extent will we succeed in maintaining our personal morale and carrying our share of responsibility by giving ourselves fully to our duties. We must be mentally alert, emphasize individual initiative, individual stability, and agile adjustment. This will help us toward adequate preparation and coordination of moral and material defenses. Through all there must be a sense of belonging. This is an important psychological factor representing the sense of love, affection, and acceptance in a group. Withal, there should be good internal mental and spiritual activity—a deep concern for our interpersonal communications—which eliminates sensational rumors and fear of unknown dangers.

18. The Morale Boosting Idea (The Regenerative Idea)

The behavior of people under extreme, crushing circumstances has taught us again how special ideas are able to influence their elan, to revive them again, to live beyond the circumstances. This may be religious faith or a political ideology or even more the awareness of an inner goal and avocation. The importance of this is that people under extreme stress repeated continually that they had to have something to believe in, a sense of purpose, an idea or ideal to yield to. It could be the fatherland, or "freedom", or "justice" or even "hate and revenge," but at the moment of experiencing the catastrophe they could experience the guiding idea as more important than their body.

I do not believe that the search for this regenerative and guiding idea is a conscious function of the mind; it goes much deeper than that. It is something instinctual. I could observe for myself in several prisoners and camp inhabitants that, after the initial bewilderment about their experiences, a need for mental budgeteering grew in them. What is the sense of the situation? How to get out? How can I preserve my own bearings? Special clinical symptoms are indicative of this growing self-assertive resistance. First, there was utter passivity, surrender, depersonalization; but then the idea began to grow, the need for understanding, the need for productive intercommunication and adherence to common faith and the need to build something for the self. We can judge this return of self-affirmation by the way the person makes his own corner, his place of greater security, even when it is only a dirty wooden bunk. He begins to rearrange the few things he has; he builds his own lair; and from this nest he begins to look out into his unbearable marginal world.

An analogy with other regenerative forces becomes very impressive. The body hardly ever gives up its regenerative capacities. Even in the sick man who is dying of cancer, the surgical wound still heals, the local regenerative forces are still there. And so, by analogy, we may say that in utter confusion, pressure and exhaustion, regenerative forces are still in action.

When the concentration camper found friends with the same ideas, or even those with greater faith and greater strength of character, life became more bearable to him. In association with others the horrors could be better faced. Mutual love and common hate, both were equally stimulating. Renewed human contact changes the inherent fear into confidence in at least one other person. When this grew into the identity with an active

working team, the temporary loss of morale disappeared.

It must be said that the stimulating morale-boosting idea is nearly always a moral idea, an ethical evaluation, faith in goodness, justice, freedom, peace and future harmony. Even the most cynical dictator needs the help of such moral ideas to boost the morale of those submissive to his regime. If he cannot give them at least the illusion of peace and freedom in addition to prospects for future prosperity, he reduces them to dull and apathetic followers. At the entrance of the concentration camp was put in great letters the luring catchword, "Arbeit macht frei"—work makes man free.

The need for moral justification and seduction by ethical values (felt even by the most ruthless tyrants) proves how deep those ideas are living in men. The enthusiasm and morale of the slave can be stimulated just as much by pseudo-ideals as the morale of free men by their reality. The dilemma in our world of screaming ideas about which is *pseudo* and what is *real* can only be solved by a deep over-all analysis of the total situation.

For our purpose, it is important to be aware of the fact that there are ideas which stimulate our morale. The more man lives in marginal situations, the greater is the need for morale-supporting values. Although the critical selection and evaluation of these norms diminish, there was more need for their stimulative action. Man is able to control and master the inner forces in himself. Yet existing ideologies may give him the right or the wrong tools. Here lies our difficult point because these ideologies themselves—though products of intuitive mass psychology—can be misused as weapons in the struggle for power.

Nevertheless, the knowledge that there are many morale-boosting ideas and recuperative forces active does not permit us to forget that there are just as many paralyzing influences. Baschwitz in his book *Du und die Masse* (3) describes so well the terror aroused by the paralyzing idea and the consequent silent panic. Rumors and awe-spreading myths stir up all the free-floating anxiety in man, ripening him for ever greater acceptance of fear-provoking stories.

19. Discipline and Morale

While all good morale implies strength and self-discipline, it may not necessarily imply a set group discipline in a political or military sense. For example, good personal morale was one of the needed qualifications for taking part successfully in the underground during the last war. The partisans, working secretly—now here, now there—relied, in their lonely combat, on their individual initiative and morale as much, if not more than, on the distant leadership and discipline. This is just the opposite of a kind of "stand-by" morale and submission impelled by blind fear and maintained from a distance, the kind which is obtained in jails or concentration camps, or in a tribe with extreme emphasis on common participation. In the first groups there was morale without discipline; in the second, discipline without morale.

Nevertheless, there is usually an inner relation between discipline and morale. Only when a certain amount of initial disciplinary training is given to youngsters or soldiers, are they well conditioned for that personal inner strength which is based on self-confidence and trust in the group as a whole, together with its authorities. Only discipline which develops gradually can lay the basis for inner freedom. This rule has been forgotten by many educators. Only a certain basis of initial, conditioned patterns gives us the confidence to stand on our own. We all start to introject our morale from others—our parents and educators. The basis of our personal morale is what we internalized from them. The subtle mutual relation between discipline and freedom starts in the cradle under the guardianship of loving and interested and consistent parents. They are the first to build morale. The conflict between discipline and morale in a group usually arises when the members are held together by compulsion or necessity. Here the inner coherence will be completely different from a situation in which there is a spontaneous loyalty to the group.

A further understanding of these morale-building principles is important for an evaluation of the inner strength or vulnerability of the various cultural groups. We may expect, according to our experiences in psychotherapy,

that where too much discipline—or even slavery—prevails, the inner cohesion of the group will be very different from that of a group respecting and holding the individual in high esteem. Nevertheless, even in the armies of totalitarian systems, we have found men who exemplify high morale. I call to mind those Japanese soldiers who—without any tie with the mother country—stuck to their lonely posts for years after the war, as though the emperor and his generals were still looking at them. They tell us something about the consistent love, security and dedication they received in the first-years of life.

20. Latent Panic and Morale

Today the words panic and morale are often used as magic catchwords behind which we may hide our latent fears even when there is no obvious outside danger or apparent inner turmoil. Political strategy may keep people in such continual awe, they may ask themselves overtly: "What will happen to our poor world?" without realizing that their ways and manner of expressing concern for it may, in a small way, co-determine its situation. Our personal morale and vulnerability can conceivably contribute to world chaos. Too much self-pity and soul searching may increase our fear of being in the world.

Individual morale is primarily dependent on inner strength, on ego strength, on self-knowledge, on good sense and simple self-confidence. People are able to stand the greatest danger if they no longer feel the need to regress or to revert to immature fantasies or to escape into disease and dependency.

Today, there is a marked tendency to deny reality and to play hide-and-seek with ourselves. Our world is full of artificial means helping us not to see, and to forget our responsibilities.

This denial of reality is dangerous because of the close relationship between our fantasy about outside danger, panic, and inner strength. We should make the public repeatedly aware of such possible dangers and inform them about their responsibilities to fight them and to ward them off. For by facing the facts of reality and becoming accustomed to the thought of the normalcy of potential dangers, we reduce the possibility of fantasied dangers and rumors with their paralyzing effect on the mind. As long as an enemy is part of our mythology, we cannot face him. When he becomes real, he becomes a challenge strengthening our inner forces. We grow stronger through the knowledge of our inner self as a part of the surrounding reality.

The formula for boosting morale is the old formula the Oracle of Delphi gave to mankind: *Know Thyself!*

BIBLIOGRAPHY

1. Alexander, F.: *Our Age of Unreason.* New York: Lippincott, 1942.
2. Ausubel, D. P.: *Ego Development and the Personality Disorders.* New York: Grune and Stratton, 1952.
3. Baschwitz, K.: *Du und die Masse.* Amsterdam, 1937.
4. Bircher, E., and Clam, E.: *Krieg ohne Gnade.* Zürich: Scientia, 1937.
5. Banse, E.: Psychologie des Zusammenbruchs. *Voelkischer Beobachter,* June 19, 1932.
6. Bluemel, C. S.: *War, Politics and Insanity.* Denver, 1948.
7. *Civilian Morale.* New York: Yearbook Society for the Psychological Studies of Social Issues. 1942.
8. Coleman, M. L., and Shor, J.: Ego development through self-traumatization. *Psychoanalyt. Rev., 40:* 3, 1953.
9. Combat (The human price of combat). *Science News Letter,* Dec. 5, 1953.
10. Document on terror. *News from Behind the Iron Curtain,* March, 1952.
11. Farago, L.: *German Psychological Warfare.* New York: Putnam, 1941.
12. Federn, P.: *Ego Psychology and the Psychoses.* New York: Basic Books, 1952.
13. Flugel, J. C.: *The Moral Paradox of Peace and War.* London: Watts and Co., 1941.
14. Fordham, M.: The individual and collective psychology. *Brit. J. M. Psychol., 21* 1948.
15. Frankl, V. E.: Group therapeutic experiences in a concentration-camp. *Group Psychotherapy,* 7, 1954.
16. Freud, A.: *The Ego and the Mechanisms of Defense.* New York: International Universities Press, 1946.
17. Greenacre P. H.: The predisposition to anxiety. *Psychoanalyt. Quart., 10,* 1941.
18. Gruber, R., and Spiegel, S. P.: *Men Under Stress.* Philadelphia: The Blakiston Co., 1945.
19. Hunter, E.: *Brainwashing in Red China.* New York: Vanguard Press, 1953.
20. International Congress on Mental Health. Report: *Leadership and Authority in Local Communities.* London: 1949.
21. Janis, J. L.: *Air War and Emotional Stress.* New York: McGraw-Hill, 1951.
22. Lasswell, H. D.: *Power and Personality.* New York: W. W. Norton, 1948.
23. Lerner, D.: *Sykewar.* New York: G. W. Stewart, 1949.
24. Lippman, W.: The real meaning of morale (short article). England: *The Sunday Times,* May 7, 1944.
25. MacCurdy, J. T.: *The Structure of Morale.* Cambridge, England: University Press, 1943.

26. Meerloo, J. A. M.: The crime of menticide. *Am. J. Psychiat., 107:* 594, 1951.
27. Meerloo, J. A. M.: Living by proxy. *Am. J. Psychotherapy, 7:* 3, 1954.
28. Meerloo, J. A. M.: Morale. *Mil. Rev.*, 1954.
29. Meerloo, J. A. M.: *Patterns of Panic*. New York: International Universities Press, 1945.
30. Meerloo, J. A. M.: Pavlovian strategy as a weapon of menticide. *Am. J. Psychiat., 110:* 809, 1954.
31. Meerloo, J. A. M.: Thought control and confession Compulsion. In *Explorations in Psychoanalysis*. New York: Julian Press, 1953.
32. Meerloo, J. A. M.: *Total War and the Human Mind*. New York: International Universities Press, 1945.
33. Meerloo, J. A. M., and Coleman, M. L.: The transference function. *Psychoanalyt. Rev., 38:* 3, 1951.
34. Menninger, K.: *Love Against Hate*. New York: 1944.
35. Mullahy, P., and others: *A Study of Interpersonal Relations*. New York: Hermitage Press, 1949.
36. National Morale. Separate Issue. *Am. J. Psychology*, 1941.
37. Ortega, Y., Gasset, J.: *The Rebellion of the Masses*. New York: Pocketbooks, 1950.
38. Pinschovius: *The Power of Mental Resistance in Modern War*. Berlin: 1936.
39. Reiwald, P.: *Vom Geist der Massen*. Zürich: Pan Verlag, 1946.
40. Reik, T.: *Masochism in Modern Man*. New York: 1946.
41. Richter, C. P.: Civilized life affects combat stress. *Science Newsletter*, July 10, 1954.
42. Discussion on Morale. Royal Society of Medicine. *Lancet*, May 20, 1944.
43. Russel, R. W.: Behavior under stress. *Internat. J. Psycho-analysis, 34:* Supplement, 1953.
44. Sava, G.: *War Without Guns*. London: Faber and Faber, 1943.
45. Sillman, L. R.: Morale. *War Medicine, 3:* 1943.
46. Spetter, J.: Community in concentration camps. *Community Service News, 9:* 5, 1951.
47. Stanton, A. H., and Perry, S. E.: *Personality and Political Crisis*. Glencoe, Ill.: The Free Press, 1951.
48. *Democracy in a World of Tensions*. Paris: UNESCO, 1951.
49. Vischer, A.: *Die Stacheldraht Krankheit*. Zürich: 1919.
50. Whitehurst, E. R.: Unit morale. *Mil. Surgeon, 112:* 2, 1953.
51. Ydo, M. G.: *Pleasure in Work*. Dordrecht: Obreen and Co., 1947.
52. Young, K.: *Handbook of Social Psychology*. London, 1945.

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THE MOLAC II—AN ALTERNATING CURRENT ELECTROSHOCK THERAPY MACHINE INCORPORATING A NEW PRINCIPLE[1, 2]

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Among our psychiatric confreres there is now an almost general agreement that electroshock therapy (EST) is the treatment of choice for depressive psychoses. We might add that EST is also the treatment of choice for any psychosis of acute onset. The enthusiastic claims of early workers that the tranquilizers would displace EST have not been borne out, especially regarding the depressive psychoses. EST, therefore, is still a useful and important tool in the workshop of the psychiatrist and will remain so until a better one is developed to replace it.

The classic Cerletti-Bini EST alternating current (AC) machine, which utilizes 120 volts, 60 cycles per second current, administered from one to five-tenths of a second, produces among others the following undesirable side actions:

1. Severe, painful head sensations when the current used is insufficient to render the patient unconscious. This results in treatment anxiety and uncompromising withdrawal of the patient from further treatment.
2. Occasional inability to obtain a convulsion.
3. A strong supramaximal convulsion which predisposes to bone fracture.
4. Prolonged apnea, post-convulsive confusion and agitation and subsequent memory deficit due to the excessive current used.

During the 18 years that EST has been used as a therapeutic aid in psychiatry, a number of modifications have been made, with the intent of reducing or eliminating the above mentioned complications. Thus, muscle relaxants were introduced to diminish the muscular force of the convulsion and prevent fractures and other musculo-skeletal complications. The first of the relaxants, curare, although very effective for the purpose intended, proved to have serious and dangerous effects and never gained more than mild favor. The most recent of the series, succinylcholine (SCC), seems to be relatively free of undesirable complications, especially when used in small doses, and is gaining favor. However, a good many psychiatrists have restrained themselves from using it, and continue with unmodified EST, due to unfamiliarity with the drug; unwillingness or distaste to adopt the unusual complex procedures of SCC administration as advocated by some authorities; the necessity to manage the apnea which is almost regularly produced with the doses of SCC commonly recommended; the suspected need of an anesthetist with added expense to the patient, etc. Unfortunately, muscle relaxants have undesirable effects. One of these is that, in the hands of many physicians, but by no means in all, SCC causes considerable anxiety from the feeling of muscular and psychic dissolution which the injection causes. This results in patients refusing further treatment. To overcome this difficulty SCC has had to be given either with a barbiturate or after a barbiturate. However, the barbiturates themselves are apt to produce complications and certainly almost always compound the apnea which SCC causes. The newly developed petit mal-grand mal SCC modification of EST which utilizes minimal doses of SCC without barbiturates, produces a convulsion sufficiently modified to prevent practically all fractures. This, together with the extra advantage that apnea is practically completely absent and therefore the patient need not be oxygenated at any time, has made the treatment so simple and so free of undesirable complications that universal adoption is probably a matter of time (1a, 1b, 1c).

Concurrently with the development of muscle relaxants the electroshock machine

[1] From Psychiatric Department, New York University, College of Medicine and Bellevue Hospital.

[2] Delivered at the Second Divisional Meeting of the American Psychiatric Association, Montreal, November 8, 1956.

itself was modified along certain lines. We wish to mention at this time only two of these changes:

1. *The glissando.* The glissando pre-convulsive current rise was introduced to minimize the fracture hazard by softening the initial thrust. As you well know, with the glissando the current flow generally begins at zero and rises within 0.6–0.8 of a second to a preset therapeutic level. With its use, the fracture rate has been only minimally reduced, and there has been little if any reduction of post-convulsive apnea, confusion and agitation. In addition, if the initial glissando rise is made to last longer, the patient may feel the current and develop treatment anxiety.

2. *The unidirectional currents.* These currents evoke convulsions after three to five or more seconds of stimulation. In view of this, we may call such convulsions threshold convulsions. Threshold convulsions are generally milder than AC supramaximal convulsions. The initial flexor spasm is fractionated into a series of mild clonic jerks which build up within three to five or more seconds to the extensor or tonic thrust which heralds the convulsion proper. All phases of the convulsion are milder, and the clonic phase may be suppressed, partially or completely, at will by the operator. The fracture rate is moderately reduced when these currents are used, but apnea, post-convulsive confusion and agitation and subsequent memory changes are greatly reduced. In spite of these advantages the use of unidirectional currents has not found favor in all quarters because a number of observers feel that with these currents more treatments than with AC currents are needed to effectuate a remission or to quickly bring under control such abnormal behavior as unmanageable agitation and suicidal drives. The psychiatrist of this faith therefore continues to use the old AC current machines and makes the best of the undesirable side actions.

The Molac II[3] is a refinement of the classic AC machine. It contains a new principle which might be called the glissando in reverse. That is, instead, as in the glissando, of a gradual increase of the current from zero to the therapeutic dose; with the Molac II the current starts with a relatively high initial dosage and quickly descends to a low therapeutic level. On a *priori* basis, the starting of the treatment with a high voltage should cause a greater initial thrust and an increased number of fractures, but in actual practice this is not so. The initial high voltage is automatically allowed to pass only for about a millisecond. This interim is not long enough to induce a fit; instead this phase of the current merely produces unconsciousness and makes the patient lose all memory of the procedure, thus precluding the development of treatment anxiety. The current producing the fit proper is of a relatively low voltage of less than 100 volts, which is allowed to pass from 2 to 3 seconds. This low current causes a milder thrust, a milder convulsion, and less confusion, agitation, apnea and memory changes than the current from former AC machines.

FIG. 1

The machine itself is small and of simple construction (fig. 1). It is housed in a box 3 x 3 x 5 inches, weighing 2½ pounds. It contains an inlet cord for attachment to the house current; a current selector switch by which one may choose high, medium and low current settings; a light indicator or pilot showing that the machine has been connected to the source of power; a treatment button and two electrode outlets. The timer found in all other machines has been eliminated as not essential. The physician giving the treatment acts as his own timer. The machine can be used instantly once it has been connected to the power outlet as it requires no warm-up

[3] Manufactured by Reuben Reiter, D.Sc., 64 West 48th Street, New York City.

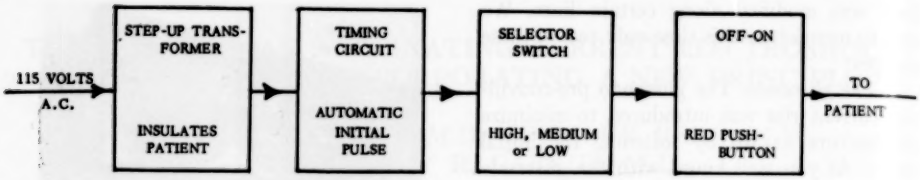

DIAGRAM 1

period. Most patients will slide into the tonic phase within two or three seconds. In giving a treatment the physician presses the treatment button, counts to himself, one-and-two-and-three, and releases the button. This produces a convulsion in 99 per cent of the patients. When it does not, the psychiatrist can immediately press the button again and hold it down a little longer to obtain the convulsion. This can be done while giving all his attention to the patient all the time, without the need to turn to the machine to reset time knobs, glissando indicators, etc., all of which are time consuming and, if they consume more than ten seconds, allow the patient's convulsive threshold to rise. It is this threshold rise after a petit mal, which at times makes it impossible to elicit a convulsion with the older AC machines. A convulsion can always be obtained with the Molac II.

The block diagram shows the main electric features of the machine (Diagram 1). A step-up transformer insulates the patient and steps up the house current voltage; this current is led into the initial pulse timing circuit; through the selector switch mechanism which allows high, medium and low settings; then to the on-and-off switch, which is the treatment button; and thus to the patient.

When the treatment button is pressed down, the current flows to the patient; when it is released, the current is cut off.

Diagram 2 shows the automatic initial pulse and convulsive currents in the three positions of the current selector switch. When this switch is pointing to high, the brief initial pulse which lasts about one millisecond is of about 190 volts, while the convulsive current is about 97 volts. The transition between these two currents is automatic. When the selector switch is pointing to medium, the initial pulse is of a magnitude of 180 volts, and the therapeutic current is about 94 volts. When the

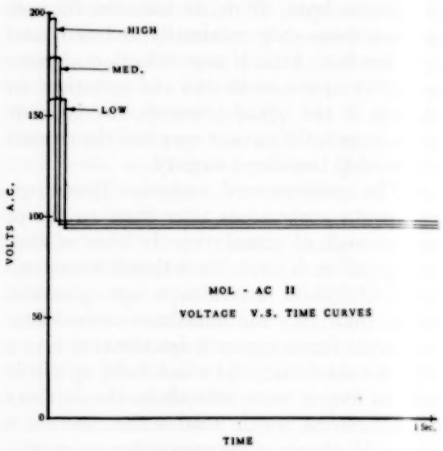

DIAGRAM 2

setting is on the low position, the initial pulse is about 160 volts, and the treatment current about 91 volts.

Which of the three selector switch positions to use depends on the convulsive threshold of the patient and the intent of the physician. With little practice the psychiatrist will master what position to use for any particular situation. Most patients can be made to convulse in the low position, and some authorities prefer this position, especially when giving unmodified treatments. This position emits the mildest of the three current intensities and produces the least post-treatment confusion.

At Bellevue Hospital, New York City, we have been privileged to treat 147 unselected psychiatric patients with the Molac II (table 1). As a control group, we are using one hundred psychiatric patients also unselected, treated just prior to the Molac II series with the Reiter amplitude modulated unidirectional current machine. Both groups of patients were premedicated with atropine, a barbiturate, and

TABLE 1

Reiter Unidirectional (D.C.) with Anectine				Reiter Molac II (A.C.) with Anectine			
	Improved	Unimproved	Total		Improved	Unimproved	Total
Schizophrenia	33	15	48	Schizophrenia	42	42	84
Involutional	27	2	29	Involutional	41	1	42
Depressive reaction	15	1	16	Depressive reaction	14	4	18
Manic depressive	4	1	5	Manic depressive	3	0	3
CBS/Senile	1	1	2	CBS/Senile	0	0	0
Totals	80	20	100	Totals	100	47	147
Total number of treatments			1,106	Total number of treatments			1,436
Average number of treatments per patient			11.1	Average number of treatments per patient			9.8
Number of patients with fractures	0	0	0	Number of patients with fractures	0	0	0
Number of patients with pain	1	0	1	Number of patients with pain	0	0	0

in most cases, 20 mg. of SCC, all administered in the same syringe about 30 seconds prior to the EST.

Clinical Results

Of 84 patients diagnosed schizophrenia in the Molac II group, 42 or 50 per cent were improved; while of 48 schizophrenics in the unidirectional group, 33 or about 60 per cent were improved. The slight difference between the two groups is not significant, so that we may conclude that the clinical results in schizophrenic patients are the same in the two groups. In the non-schizophrenic group, of 63 patients in the Molac II group, 58 improved and 5 were unimproved; while in the unidirectional group, of 52 patients, 47 patients improved and 5 were unimproved. Here again there is little difference in the clinical results which is around 90 per cent in each of the two groups. We may conclude that in general the clinical results are just as good in the Molac II group as in the unidirectional group.

Our definition of improvement is that the patient either recovered fully and at the time of discharge was free of all symptoms and had insight; or was sufficiently recovered to be returned to the community although he had some minor symptoms and only partial insight. The unimproved group consisted of the patients who were transferred either to a private sanitorium or a state hospital.

Other Findings

The average number of treatments were 11 for the unidirectional groups and 9.6 for the Molac II treated patients. No anxiety as the result of the treatment was elicited in either group.

One patient in the unidirectional group complained of back pain; none in the Molac II group. No fractures occurred in either group. All patients had x-rays of the thoracic vertebra before the first treatment and at the end of their series of treatments. Convulsions were obtained on all occasions in both series.

We were not in a position to compare Molac II treatments given without muscle relaxants or other medication with patients similarly treated with the old AC machines. Fortunately, this has already been done in a limited degree by Asrican (2) at King Park State Hospital, New York. He gave 277 Molac II treatments to 20 patients, and compared the results with 13,184 ordinary AC treatments given to 412 patients. He concludes that "with the Molac II grand mal seizures were produced in all patients. None experienced cyanosis. There were no variable EST responses (petit mal responses at one time, grand mal at another). Normal breathing returned promptly, the pulse rate, initially increased because normal within minutes after convulsion. It was possible to reduce the time of watchful post-treatment observation from one hour to one-half hour. The diminution of confusion was striking. About ten minutes

after treatment the patients were in good contact, could leave their beds and walk about without staggering. The Proteus maze test performed 30 minutes and again one hour after completion of EST confirmed our clinical observation. Those treated with our former machines showed a pronounced defect in the test performance after 30 minutes, but cleared up after an hour, while in patients treated with Molac II there was no deficit after 30 or sixty minutes. No panic reactions were observed, although three patients still experienced anxiety while their depressive features subsided."

Conclusions

The Molac II, an AC electroshock therapy machine which employs a new principle that may be described as the reverse glissando, is an improvement over older AC machines as it produces milder convulsions, less confusion, less apnea, less treatment anxiety, and may produce fewer fractures. It yields the same clinical results as unidirectional currents. In addition, the Molac II is extremely simple in construction and use, and never fails to produce a convulsion. We recommend that its usefulness be explored further.

BIBLIOGRAPHY

1a. Impastato, D. J.: Apnea in succinylcholine-modified electroshock therapy: its causes and management. With a note on a new method of succinylcholine administration without barbiturates. *Dis. Nerv. System, 17:* 347, 1956.

1b. Impastato, D. J.: The safer administration of succinylcholine without barbiturates—a new technic. *Am. J. Psychiat., 113:* 461, 1956.

1c. Impastato, D. J., and Gabriel, A. R.: The petit mal-grand mal modification of succinylcholine administration in electroshock therapy. *Dis. Nerv. System* (in press).

2. Asrican, E.: Electric shock treatment with new AC equipment. *Dis. Nerv. System, 17:* 232, 1956.

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THE PFISTER COLORED PYRAMID TEST

P. O. O'REILLY, M.B., B.Ch.,[1] RUDOLF HOLZINGER, Ph.D.,[2] AND DUNCAN BLEWETT, Ph.D.[3]

The Problem

In recent years more and more authors have turned their attention to the development of objective diagnostic measures. With this view in mind the Objective Rorschach (2) was devised. This test offered an extremely promising method of differentiating between normals, neurotics and psychotics. In our perusal of the psychological literature we found references to the Pfister Pyramid Test (3). This test seemed to offer the possibility of further differentiating within the psychotic group. Heiss (1) had found that a high proportion of acute schizophrenics destroy the colored pyramids by the use of white, while normal and neurotic adults very rarely do so. It is the purpose of this paper to investigate further this difference in terms of its diagnostic possibilities.

Description of the Test

The test is presented in standard form with 24 colors. Heiss asked each individual to produce three pyramids. However, our initial work suggested that since there was no change with regard to the use of white between administrations immediately subsequent to each other, the construction of one pyramid should prove an adequate test of each individual. Because white appears to be the diagnostically significant color, we increased the amount of white by one hundred per cent.

The test itself consists of presenting the patients with a pyramid consisting of 15 blank squares on white paper. The following instructions are given: "Please make a beautifully colored pyramid by picking out any colored squares from the box. Glue the squares on the pyramid in any shape or form that you like."

When the patient has completed his pyramid, the pyramid is held at a distance of ten feet for his observation. At this distance white squares used in the construction of the pyramid are practically indistinguishable from the color of the background. The patient is asked, "Do you like the pyramid, or would you like to change any color?" If he wants to change it, he is allowed to do so. If white has been picked in the original selection, it is noted if he changes his white selection; other color changes are not recorded.

Subjects

The subjects included 68 consecutive admissions to the Saskatchewan Hospital, North Battleford.

Diagnosis was made by the clinical staff of the hospital in conference. Forty-three of the subjects were diagnosed as schizophrenic. Of the twenty-five diagnosed as non-schizophrenic, eleven were diagnosed as psychotic, eleven as psychoneurotic, and three as pathological personalities. Specifically of the psychotic non-schizophrenic group, four cases were diagnosed as manic depressive psychosis, two cases as puerperal psychosis; one as involutional melancholia; two as involutional psychosis (paranoid); one as organic psychosis; and one as psychosis with mental defect. Of the neurotic group nine were diagnosed as neurotic depressive reactions; and two simply as psychoneurotic.

The research staff were unaware of the clinical diagnosis given on any case.

It was planned initially to include a normal group. Unfortunately, it proved impossible to obtain subjects for testing under conditions similar to those observed in the examination of the hospitalized groups. However, a group of 48 student nurses just admitted to the training school were tested in a group situation. The results were to be anonymous, and it was therefore impossible to test for integration under pressure. While the group was cautioned

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about being influenced by the behavior of other people, it seems very likely that such influence existed nonetheless. In this group setting, the subjects took a handful of colored paper squares from a large container in the center of the room. Their initial selection therefore undoubtedly played a large part in the colors they utilized. Despite these gross shortcomings in the method of correcting data on this normal group, the results are included for the sake of interest.

Method

The Pyramid Test was administered to all of the 68 hospitalized subjects. At the same time, the sex, age and educational level of each patient were recorded.

In order to obtain a measure of degree of illness within the psychotic group, the Objective Rorschach was administered to 25 cases, including 20 schizophrenics and 5 psychotic non-schizophrenics (two puerperal psychosis; one diagnosed as an involutional paranoid state; one as psychosis with mental defect; and one as manic depressive psychosis).

TABLE 1

		Schizophrenic	Non-Schizophrenic	Normal
Pyramids destroyed	a) unstructured	20	0	10
	b) beheaded	5	1†	2
	c) structured	2	0	2
	d) integrated under pressure	6	1‡	—*
Pyramids not destroyed	a) unstructural	3	6	34
	b) semi-structural	1	5	
	c) unicolored	1	2	
	d) structured	5	10	
Total		43	25	48
Percentage destroyed		76.7	8.0	29.1

* The normal cases were not tested for integration under pressure.
† Organic psychosis.
‡ Puerperal psychosis.

Assessment

For assessment purposes the results of the Pyramid Test were divided into two categories: 1) pyramid destroyed and 2) pyramid not destroyed. Destruction of the pyramid was defined as any use of white in the structure of the pyramid. These two main categories were further broken down. Destroyed pyramids fell into the following classes: (a) Unstructured destroyed pyramids were characterized by haphazard color distribution with no attempt at uniformity, harmony, symmetry or pattern. (b) Beheaded pyramids were those crowned with a white square, (c) Structured but destroyed pyramids were those showing fair structure but which included white squares. (d) Destroyed or beheaded pyramids integrated under pressure were those which had been destroyed in any way by the use of white, but which upon interrogation were integrated by the patient by changing the white to a colored square. Pyramids which were not destroyed fell into the following four classes: (a) Unstructured but intact pyramids were those which, while having a haphazard color distribution and no attempt at pattern, did not use white. (b) Semi-structured pyra-

TABLE 2.—Pyramid Test
Destroyed/non-destroyed (including integrated under pressure)

Variables	Difference between Means	Level of Significance	χ^2 Value	P
Age	.55 years	Non-significant	—	—
Education	.35 years	Non-significant	—	—
Sex	—	—	.01	Non-sig.
Objective Rorschach	3.05*	Non-significant*	—	—
Schiz./Normal	—	—	20.6	.01
Schiz./Non-schiz.	—	—	31.9	.01
Schiz./Non-schiz. (psychotic)	—	—	15.28	.01

* These figures involve only 25 cases (20 schizophrenic and 5 non-schizophrenic).

mids showed some evidence of an attempt at structure. (c) Unicolored pyramids, (d) Structured pyramids maintained a pattern and a multi-colored scheme.

For the statistical analysis the results of the pyramid test were dichotomized as destroyed or not destroyed—the latter group including the integrated under pressure category.

Results

The results of the analysis of the data on the pyramid test are presented in table 1.

The results of further analysis to determine whether pyramid test scores were influenced by sex, age or educational level or degree of illness are presented in table 2. In the case of the dichotomous variables of sex and diagnosis, χ^2 has been used as the measure of the level of significance. In the other variables (age, education) t tests have been used.

Discussion of Results

Results on the Pyramid Test are apparently independent of variations in age, sex, education or degree of illness (as measured by the Objective Rorschach). The Pyramid Test is successful in differentiating significantly between the schizophrenic group and the other groups tested. Although the results obtained for the normal group are suspect owing to the method of collection of the data, this group, too, was differentiated from the schizophrenic group well beyond the level of chance. Further investigation of the behavior of normals as opposed to schizophrenics would seem worthwhile.

These results strongly suggest that the Pfister Test provides a useful method of differentiating between the schizophrenic and other psychiatrics groups.

Summary

Sixty-eight consecutively admitted patients Tere tested with the Pfister Pyramid Test. Of this group, 43 were classed as Schizophrenic, 25 as non-schizophrenic.

Seventy-seven per cent of the schizophrenic subjects destroyed the pyramid by the use of white, and eight per cent of the non-schizophrenic group destroyed. The Pyramid Test thus differentiates between these groups at the one per cent level of significance.

We wish to thank Dr. Demay, Superintendent, and the Staff of the Saskatchewan Hospital, North Battleford, for their cooperation and help. Approved by the Saskatchewan Committee on Schizophrenic Research. Supported by the Department of National Health and Welfare, Canada.

BIBLIOGRAPHY

1. Heiss, R.: Der Farbpyramid—Test Nach Max Pfister. Bern: Verlag Hans Huber, 1951.
2. O'Reilly, P. O.: The Objective Rorschach. *J. Clin. Psychol., 12:* 1956.
3. Pfister, M.: *Psychologische Rundsshan, 1:* 3, 1950.

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PSYCHOGENESIS IN ULCERATIVE COLITIS
A Case Report

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The authors are briefly reporting the following case mainly because of one very interesting facet which may contribute to the evidence for psychogenesis in ulcerative colitis. This provocative feature is the presence of the disease in a mother and an *adopted* daughter. Since this is a rare disease in general, and more so among children, it strikes us that there would be rather strong improbability of such a relationship occurring by chance. Considering that the adoptive relationship rules out genetic factors, we are left with environmental explanations. Of the latter, psychogenesis would probably be the foremost of the possible connections known today.

Case Report

When first seen by us, Tina, as we shall call her, was an eleven-year-old girl who had initially developed bloody mucoid diarrhea three years previously. This occurred the weekend before the beginning of a new school year, and one month following an upper respiratory infection for which she had received oxytetracycline. This first attack abated in a few months, and aside from occasional diarrhea and minimal bleeding, she was well until a week after her return to school following the Easter vacation in 1956. This again was shortly following a respiratory infection. At the time of both attacks, all studies, including proctoscopy, were consistent with a diagnosis of ulcerative colitis. No pathogenic bacteria or parasites were found. Within six months of its onset, her recent attack was in relative remission under medical management, including steroid therapy.

In late May of 1956 psychiatric consultation was sought by the pediatrician (B. D.) for several reasons. It was noted that Tina seemed depressed, or as it was put by a hospital nurse, "I can't quite put my finger on it, but she doesn't seem to be a happy child." Also, it impressed the pediatrician that this eleven-year-old girl had cried for the first time in five years when recently ordered to the hospital. Furthermore, medical management was made difficult by the parents' hostility and rigidity.

The psychiatrist (R. A. H.) found Tina to be an attractive child in a rather wan, ethereal and delicate way. Her superior intelligence was indicated in many ways such as her usage of many large words, including medical ones. Her expressed ambition was to become a nurse, and she spoke with understanding about the relation of nervousness to her disease. She mentioned being unhappy when her mother left her alone to do jury duty while Tina had the flu attack that preceded the recent relapse. She avoided any real penetration into her significant interpersonal relations, but did paint her mother as a frequently ill person who "had Lichen Planus from nerves" (Tina's own words). The general impression was that of a covertly depressed "little old lady" with hypertrophied intellectual development and a repressed and controlled emotional life.

Twenty years ago Tina's 52-year-old mother suffered for about six months with 8–10 bloody, mucoid stools per day. Our attempts to obtain medical verification of a strongly presumptive diagnosis of ulcerative colitis were frustrated not only by the passage of time but by the fact that only the services of a "Naturopath" had been sought at the time. Tina was not told of her mother's illness until after she developed it herself, the mother asserted. The mother strongly impressed both authors as a cold, detached, rigid, perfectionistic, dutiful, obsessive, controlling and hostile anal character whose personality structure is replete with reaction-formations and moral masochism. Despite nine years of marriage and investigated but undiagnosed infertility, no attempts were made to adopt until nine months before Tina was placed with this couple. The father presented generally similar characterological features to his wife but was less controlled, more overt in his hostility, and more overprotective towards Tina. After the psychiatric consultation he angrily and illogically declined further exploration of psychic factors *because* (!) "This upsets Tina, and when she is upset she bleeds."

The child was known only to be born of a "healthy 23-year-old (Caucasian) mother". She appeared normal on adoption at two months of age. Early toilet training resulted in fecal continence by six months, and she was dry at one year. Also precocious was her speech, beginning at seven or eight months. The parents similarly emphasized that she has always been an extremely sensitive as well as obedient child. "She is never idle a moment", and has been an exemplary scholar as well as very popular with her peers.

Comment

Unfortunately, the unavailability of further psychiatric and psychologic studies and the consequent fragmentary information preclude definitive psychodynamic conclusions in this

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case. However, a number of clues seem to suggest a psychodynamic skeleton. It seems, for one thing, very tempting to align the mother's very obvious characterological anality not only with her own colonic disease, but also with the fact her daughter suffers the same condition. This is highlighted in the child's very early bowel training. At one psychodynamic level, it seems that this very obedient though sensitive girl has overtly submitted to the maternal discipline, suppressing most outward show of affect ("hadn't cried for five years"). One suspects that overflowing repressed affect (principally rage) may be finding its target in the "obedient colon", whether or not defecation is seen as the symbolic expression of hostility. One notes the relationship of her attacks to the return to school, and on the recent occasion there was also the mother's leaving the child during the preceding (respiratory) illness. Though she is a fine student, we wonder how much school symbolizes submission to this intellectualized mother.

However, we do not wish to belabor a weak case for the specific psychodynamics at the expense of neglecting the over-riding factor of the adoptive relationship here. The latter prompts us to wonder if it might not be fruitful to study ulcerative colitis in adoptive children. It would be interesting to know, first, if there if a greater incidence in that group than in non-adoptive children. If so, this might be meaningful. Then, germaine to the case reported here, it would be provocative if it were found that there is a higher incidence of the disease among the adoptive mothers of "colitic" children than among the adoptive mothers of non-colitic children. If the latter proved out, it would certainly not establish the psychogenesis of this disease, but it would seem to disprove any theory of pure genetic predisposition. This would clear the field for all environmental theories, among which we feel the psychological would be paramount.

We wonder if a similar approach to other psychosomatic problems might also be profitable. It might help to clarify the relationship between psychogenic and hereditary factors. Differentiation of "pseudo-heredity" from actual heredity might be facilitated.

Summary

A case is reported of ulcerative colitis occurring both in a mother and her adoptive daughter. Fragmentary psychodynamic clues are consistent with a psychogenic explanation of the colitis. The case suggests lines of investigation of ulcerative colitis and other psychosomatic disorders among adoptive children.

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THE THERAPEUTIC VALUE OF SETTING LIMITS WITH INHIBITED CHILDREN[1]

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Therapists often divide neurotic children into two broad categories: the inhibited child who needs to relax his excessive controls and the acting out child who needs to develop a stable system of controls. In the former case the therapist's non-punitive attitude decreases the child's fear of his impulses and of self-expression in general. The situation is quite different for the acting out child, especially if such behavior results from inadequate or inconsistent parental models. Here the therapist, within the framework of a positive relationship, gradually requires an increasing amount of self-control of the child. One of the frequently used techniques in this process is that of "setting limits". The underlying philosophy here is that the acting out child is basically frightened by his feeling of being out of control; if the therapist, in a spirit of genuine helpfulness, firmly and, at times forcibly, lets the child know that certain kinds of behavior will not be tolerated, the child is reassured.

This paper will not discuss the subtleties and implications of this process of setting limits. Rather, it will question the generally accepted idea that such a technique, while just right for the acting out child, is just wrong for the inhibited one who already suffers from the consequences of severe or excessive limits. Such a statement might be generally true, but there are some exceptions. There is a certain kind of child who is both very inhibited and very much reassured by the setting of limits in therapy. It is this kind of child who will be discussed in detail.

The two children to be described, Ray E. and Ed T., are patients on a Psychosomatic Ward for Children in the Department of Psychiatry at the University of Illinois Neuropsychiatric Institute. This is a psychotherapeutically oriented ward in which the child's total living experience is considered part of the therapeutic program. He is not only given intensive individual therapy, but the entire staff is trained to be aware of his needs and to meet them in a constructive manner. In addition, the mothers of the patients receive therapy whenever it is possible. Extensive records are kept of ward behavior, and of therapy with the child and the mother. Illustrative material in the present article is taken from such records.

Both individuals to be discussed are 12-year-old boys, and both have ulcerative colitis. One has superior intelligence and one high average. Both can be described as being at the opposite pole from the acting out child. Pale, thin and sickly, they not only avoid almost all direct expressions of strong feeling but also the sublimated outlets for such feelings like competitive games. Their reality contact is good, and they are intellectually alert and socially perceptive. Although they make intense demands for individual attention or affection, they are emotionally isolated to an extreme degree. Affectively they are unresponsive and solitary.

Upon observing them more closely one finds that, in some important ways, they are different from the usual picture of the inhibited child. This difference can best be summed up by saying that these are children who have to be their own parents. A certain amount of this is also present in most inhibited children who often take over parental prohibitions and develop severely punitive superegos. With these two boys the process has gone even further—they have assumed the adult's responsibilities for allaying anxiety, for structuring daily activities, for sustaining hope. Thus the child takes over not only the superego but the ego functions of the parent as well.

The boys' dynamics can be expressed in the following way: Since my parents, at crucial times, could not take care of me, I must take care of myself. However, this "taking care of myself" has little of the positive quality of healthy independence as there is a striking

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lack of self-confidence in both boys. Nor are they like the pseudo-mature child who becomes a serious little old man but also seems to derive a considerable amount of security from this role. What is so impressive about both boys is the tremendous anxiety, just beneath the surface, which constantly has to be mastered. Such anxiety can range from a vague persistent restlessness to near panic. As one comes to understand these boys, it is clear that beneath the attitude, "I must take care of mysel'f', lies the implicit terror, "because no one will take care of me".

An excerpt from the ward notes on Ray will illustrate this point. He is described in the first month: "... speaking so rapidly that he frequently could not be understood he asked endless questions about every aspect of the hospital, the individuals therein, the exact location of the hospital, the operation of the ward, the other patients, their illnesses, provisions for emergencies, where the nurses came from and how long they had been here, how long the others had been here, the food, the equipment. His curiosity was like a driving force, insatiable and knowing no limits other than those imposed by the staff either out of irritation, weariness, or discretion. When he was not asking questions he explained and instructed the staff regarding his needs—his diet, the things he could and could not eat." The picture of Ed's first month was quite similar although much more closely tied in with his illness since he was a desperately sick child.

The illustration hints at another important feature of the boys' behavior. Unlike the usual picture of the neurotically inhibited youngster, self-control is not enough—they must strive for control of their environment also. The unknown or the unexpected is by definition dangerous, and they must work feverishly to neutralize such fantasied threats. This they do by gathering all the information they can about the future, and by trying to fit people and events into consciously planned schema. If an event is unaccounted for, or if people are free to do what they please, then all kinds of destructive forces will be set loose. Thus there is an exaggerated intellectual investment in anticipating even unimportant happenings, and an unhealthy use of social techniques to manipulate others into meeting their need to feel safe.

In order to enrich the understanding of these boys and of the therapeutic effects of setting limits, manifestations of the basic pattern—a child having to be his own parent—will be discussed in terms of the mother-child interaction. A more comprehensive discussion of this matter, especially as it relates to ulcerative colitis, will be found in other research reports emanating from the Psychosomatic Ward. One final caution: the following should not be regarded as a comprehensive or necessary list of interactions; other types of mother-child relationships might well produce the same results in the child.

In certain important respects the mothers of the two boys are strikingly different. One is exceedingly possessive, inconsistent and disorganized, while the other is exceedingly cold, angry, but efficient. What they have in common is the fact that they are both relentlessly intrusive and controlling mothers. Because of their different character structures they exercise this control in different ways. Mrs. T. relates in an intellectual manner, continually admonishing Ed to be "a good boy" in the sense of not causing her any trouble, but judging his behavior as bad. Mrs. E. is pathologically close to Ray, having him sleep with her, washing his hair, and telling him no one can take care of him the way she does.

It seems somewhat contradictory, then, that the boys are in terror that "no one will take care of them," when they seem to suffer from an excess of attention. In discussing this matter a number of points will be made, in an order of decreasing obviousness.

The simplest point is that intrusion and control, whether arising from cold rage or possessiveness, are in no sense healthy caretaking. Each in its own peculiar way communicates destructive intent to the child—the first in terms of simple annihilation and the second in terms of being swallowed up by the mother. Obviously healthy caretaking is a much different matter since it is oriented toward fostering growth and individuality in the child. This intrusive control has two other damaging consequences. It means that, for the child, intimacy becomes associated with hostility

rather than with gratification. This in turn engenders a deep mistrust of closeness and a suspicion that the show of affection conceals a destructive intent. Secondly, it means that the pathological elements in the relationship are continually being stirred up by the omnipresent influence of the mother. The child is given little opportunity to develop other significant relationships or to establish himself as an independent individual outside of the home setting. This sense of inescapable entanglement contributes greatly to the child's anxiety that there is more danger in the world than he ever could be able to master.

Another characteristic of good caretaking is that the assumption of parental responsibilities maximizes the freedom of the child. Major decisions and the routine affairs of daily living are managed by the adults who, obviously, are the family members most qualified for these tasks. When this is done properly, the child is usually unaware of the process and of the protection he derives from having a well-structured environment. Only the faults in the structure are noticeable and communicate anxiety to him. The boys under discussion experience little of this healthy "irresponsibility" of childhood. (When asked what he was going to do when he grows up, Ed answered, "Worry.") On the contrary they have been burdened with many of the responsibilities their mothers could not handle. Again because the mothers differ, different burdens are shouldered by their sons. Ray has the task of trying to make his mother's life more organized, more sensible, more realistic. This extends to such details as what clothes to pack when going away, and how to use want ads in finding a new house. On the ward he continually had to remind his mother about rules in an effort to counteract her attempts to prolong visiting hours and phone conversations. This pattern was equally as striking when the mother was not present. After taking a walk with Ray one of the ward personnel said she got the feeling that he was the adult; he told her to watch where she was stepping, to look out for the light on the street, directed her while driving, told her where to park, insisted she buy ice cream in a certain store which had bargain prices. He was also concerned on the ward with such domestic matters as turning off the gas, checking the ice box door, counting the eggs. Ed's mother, being such a capable person, does not need this kind of help. Instead, she is always pushing him to take care of himself since she is continually resentful of any demand he might make on her. In addition to fending for himself, however, Ed is also charged with the more dramatic duty of protecting his mother from the panic she feels in relation to his illness. The illness itself represents a shattering of her drive for complete control over her boy and also stimulates the death wishes which are never far from the surface. Her response is one of helpless rage and anxiety, and it is Ed's responsibility to reassure her that he will be all right. When one adds the fact that Ed is a desperately ill child, making 30 or 40 trips to the bathroom a day, the magnitude of his burden becomes even more impressive. Another facet of this came out when Ed began talking of the many years he had spent in the hospital. His great concern was over the distress and uncertainty his parents have felt all this time, and he ended up by saying, "I wonder how they can stand it."

This brings up a further point. It was mentioned before that these mothers could not take care of their children "at crucial times". This point deserves elaboration. It is to be expected that no parent can handle all aspects of caretaking effectively; a child is bound to hit upon a number of areas which will call forth irrational rage or anxiety or non-constructive defenses. Although this means that the inadequacies of the parent stand a good chance of becoming the vulnerabilities of the child, nothing pathological is implied. What makes the process so devastating in the present cases is that, psychologically speaking, the mothers fail their child in life-or-death matters. This means that they leave their child with a fundamental doubt as to whether he is loved or not. With Mrs. T. it is a case of extreme rejection. She describes Ed as a "demon", says she never could love him, and strongly hints that she wishes he would have died instead of her daughter. With Mrs. E. the pattern is somewhat more complicated. Although she is possessive, she is also so deprived herself that she basically cannot tolerate the idea of her boy receiving love and is driven to undermine him. She is self-indulgent rather than loving and is

jealously resentful of the possibility that her boy might be gratified in his longings for affection. Her self-indulgence also means that, if Ray would establish a positive relationship with someone else, she would be deprived of a source of gratification; thus she is driven to convince her son that, literally and figuratively, he would perish if she herself did not care for him. Parenthetically it should be noted that these mothers fail their boys because they themselves were failed. Both were deprived of maternal affection, and, in spite of a compensatory effort to be good mothers, their basic hopelessness is near the surface. This despair is what has been communicated to their sons, both of whom have strong depressive trends.

The final point is the most difficult to describe. These boys have to take care of themselves in the sense of keeping hope alive. Again this should be a parental function, but one which goes beyond the previously discussed matter of parental responsibilities. In a healthy parent it is probably totally unconscious or taken for granted. It is a basic attitude not only of love but also of confidence in the child and a positive envisioning of his future. The experience of being with the child and the projection of this relationship forward into time have an intrinsic positive value. For the child this sense of being valued and trusted serves as a reliable external source of strength. However, for Ed and Ray no such source exists, or it is too sporadic and contaminated to be trusted. In order not to capitulate completely to a feeling of defeat, they must generate their own sense of confidence in themselves and their ability to master the anxieties which beset them. For example, when Ed is suffering the excruciating pain from his colitis, he also feels that he must see this trial through on his own. Too often both boys are left with only the courage and self-trust which they themselves can muster in a crisis.

This, then, is the picture of the child who must take care of himself by becoming his own parent. The driving forces are anxiety over being destroyed and despair over feeling unloved. The defense is that of assuming responsibility for himself and his environment; responsibility for maintaining perfect self-control, for controlling his surroundings so as to provide a reliable structure and protection against fantasied dangers; responsibility for compensating for his mother's inadequacies; and, finally, responsibility to keep alive a sense of faith in himself and his ability to master difficulties.

* * * * *

It is rather easy to understand why setting limits can be therapeutic for children with this kind of personality problem. However, it should be made clear, at the start, that this is not the primary therapeutic technique. With such children the establishment of a sense of trust in adults and a feeling of being loved and valued is the basic task. As with most inhibited children, therapeutic progress consists in helping the child to express his feelings without undue anxiety. However, within this general framework the technique of setting limits has a definite place.

To be effective, setting limits should be used only after a positive relationship has developed between therapist and child; otherwise the therapist runs the risk of becoming identified with the intrusive parent. The essence of the experience is the child's feeling that he can trust an adult and that the adult has both the understanding and the authority necessary to tell him what is best. Thus the child no longer has to make every decision for himself, no longer has to plan and structure his environment. Because he feels the stability and constructive authority of the therapist, he can allow himself to relax and to become more of a child. "Being taken care of" is no longer equated with vulnerability but with being unburdened of some of the responsibilities which have been assumed.

There are many examples of this process. When Ed and his therapist were having lunch together, she refused to let him have a second malted milk; at first he was resentful, but later made a point of saying he was "comfortably full". In school, Ed kept delaying handing in a report and finally said he was no longer interested in doing it. The teacher said that she understood how he felt but that school could not be interesting 100% of the time and "there are always things we must do. As your teacher I know best and I feel that this work has to be done." He whined and accused her of not wanting to help him get well, but was in high spirits

immediately after class, and was relaxed and friendly with her next day. The same process takes place even at the physiological level; when Ed is around his anxious mother, he cannot control his need to go to the bathroom, but when either his father or his therapist says he just has to wait a little while, he is able to control himself. This should not be thought of in terms of "secondary gain" but rather in terms of the child's responding to the stability or instability of the adults in his environment.

In the above examples it will be noticed that Ed's initial response is often one of anger. This is characteristic. The most obvious explanation is that it represents a transference phenomenon, the therapist being identified with the controlling mother. However, there might well be other factors involved. The anger might be a reaction to the temptation of becoming little and dependent which the therapist's behavior now stimulates. Since the child has invested so much in avoiding this state which, for him, is an extremely vulnerable one, such a temptation threatens to upset his equilibrium. Another factor which is involved is that being told what will and will not be allowed might be regarded by the child as an assault on his narcissism. This is because he not only has a need to control the world but also comes to feel that he actually does control the world—a feeling not too far removed from reality because of his constant manipulation. Thus a firm belief in his omnipotence is present along with a tendency to regard others as inferior. To challenge this narcissism and to oppose this power with the stronger authority of the therapist arouses immediate resentment. It is only after the anger has been discharged that the crucial response is seen—i.e., the relief at being unburdened of responsibilities.

* * * * *

It is interesting to compare this process to the one which takes place when limits are set for an acting out child. In a sense the impulse ridden child is the mirror image of the inhibited child described above; instead of being pathologically controlled, responsible and reflective, he is pathologically impulsive, irresponsible and unthinking. In light of the great dissimilarity in personality structure, the number of similarities in the therapeutic process itself is striking.

To begin with a positive transference must be established in both cases before the setting of limits is therapeutic. Otherwise there is the danger that this maneuver will be interpreted as proof that the therapist is hostile, depriving and rejecting "like all the rest". With both kinds of children the therapist must be sure of his own authority and the genuinely therapeutic effects of his limit setting activity. Indecisiveness spurs the one child on to greater provocativeness and convinces the other that he can only rely on himself. In both cases setting limits is most effective if it is concrete and immediately meaningful to the child in terms of protecting him from distress. This might be easier to accomplish with the intellectualized inhibited child than with the impulsive one who is more a creature of the moment.

There is a final similarity which is more subtle. As was mentioned above, one of the dangers of setting limits is that the child will take this as proof that the therapist is basically hostile. However, the therapist also has to contend with the continuing efforts to prove that he is "like all the rest". The impulse ridden child does this directly through overtly hostile acts. If he can get the therapist to retaliate in a similar manner, then he can justify his own incessant anger. The inhibited child is more devious and intellectually refined, but in his own way he is insatiably demanding and continually manipulative. Any irritation or antagonism in response to this demandingness is taken as proof that the adult is "really" hostile. Thus both kinds of children seem more at home in a world of endless friction since this protects them from the vulnerability they feel when exposed to an intimate relationship. Such willingness to perceive antagonism adds greatly to the difficulty in making limit setting a therapeutic procedure.

In view of such similarities it would seem that, as a therapeutic technique, the procedure is not very different for the two kinds of children. However, there are also several differences. The most obvious one is the relative importance of the technique in the therapy of the two kinds of children. As was mentioned before, setting limits occupies a relatively

minor place in the treatment of the overly responsible child; it is an auxiliary skill although quite a necessary one. With the acting out child the whole dynamics of therapy often revolves around the intricacies of the process of setting limits; the skills involved are essential ones.

The most significant difference, however, is the fact that setting limits serves a diametrically opposite function in the two cases. For the impulse ridden child it aims at increasing self-control and responsibility; for the inhibited child it aims at decreasing excessive control and responsibilities. The impulse ridden child is victimized by the primitive elements in his personality, and he needs help in developing a stabilizing ego and superego—i.e., he must learn how to grow up. With the inhibited child the superego is too strict and the ego too burdened with adult functions; the aim of setting limits is to relieve him of the burden of such responsibilities so that he may enjoy the legitimate irresponsibilities of childhood.

This article stems from discussions with the entire staff of the Children's Psychosomatic Ward. The author is particularly indebted to Dr. Irene M. Josselyn for the theoretical formulations, and to Dr. Jeanne Spurlock, Dr. Viola Brody, Mrs. Kay Field, and Mrs. Janet M. Smith for insights into the specific cases.

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THE PLEASURE PROCESS

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Emphasis on study of anxiety, guilt, and aggression ("emergency emotions") has resulted in neglect of the role of the "welfare emotions" (4). This paper reports one aspect of a series of investigations designed to explore that role. The present study is concerned with "pleasure" as a process. The data were obtained by distributing approximately 3,000 questionnaires to men and women between the ages of 14 and 75 years who reside in rural and metropolitan areas of the United States. These forms asked the recipients to: "Think of any experience which gave you a lot of pleasure, joy, or delight. Try to put yourself back into the mood you had at the time. What were the inner feelings, the sensations inside, that you felt? Please describe the *feelings* of pleasure, *not the experience* that produced them" (1).

The answers to this question represent the subject's description of what he can see within himself as "pleasure". The frequency and completeness of comments pertinent to any issue being studied in this material depend not only on the significance of the issue but also on the respondent's capacity for introspection, ability to verbalize, willingness to make the effort, etc. Within these limitations, the response to the question describes that aspect of the pleasure experience which is reflected in awareness ("the reporting process") (5). This awareness of pleasure seems to reflect inner activity, chiefly at physiologic and psychodynamic levels. Specific items fall into six categories:

1. *Reports of somatic sensation.* This refers to such sensory components as "pulsating", "tingling", "vibrating", "chills", etc. These sensations are described with varying degrees of clarity and specificity of localization. A clear description is exemplified in this quotation:

> A sensation such as is elicited by something just touching the arm hairs.

A specific localization would be:

> A funny prickling of the inside of the flesh in about a six inch band above the waist.

2. *Reports of affect.* This refers to direct awareness of emotional components within the total experience which the subject apprehends as "pleasure". Where affect is reported, there is a greater or lesser adulteration of the primarily "welfare emotions" by "emergency emotions" (4). The following quotations exemplify this mixture:

> A combination of excitement, nostalgia, and anticipation.

> During the experience I sometimes felt a little nervous, but this feeling didn't last very long.

> It was at once both tenseness and easiness.

3. *Reports of symbolic analogy.* This refers to those aspects of the pleasure experience which the subject describes in terms of an unconscious model. The feelings are described by reference to an "as if" analogy which implies an unstated model. In such descriptions as:

> I feel vital, very alive and fresh and clean inside—*as if* [author's italics] a nice breeze was cleaning me up (inside);

> I felt exhilerated [sic], completely refreshed *as if* [author's italics] a wave of newness had drenched me,

a model is explicitly stated. In such statements as:

> I felt somehow pure

or

> You have a certain feeling of satisfaction within,

the model is implied and the statements can be rephrased:

> I felt *as if* I had been purified

or

> You have a certain feeling *as if* your inner needs have been satisfied.

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Sometimes the description is sufficiently full for a more specific unconscious model to emerge. Instead of the general category (e.g., "purification" or "satisfaction"), a more particular picture may appear. In the following example, one can see how the general model of "satisfaction" is particularized in a womb fantasy, the subject describing his pleasure experience in terms of an infant curled up inside the mother:

> It was as if I were in a big dark void and I felt warm and very comfortable. I had no real thought in mind, but I felt close, safe, content. . . . I didn't know how long it would last and I didn't care. It wasn't extreme excitement but a dreamy sort of semi-consciousness.

4. *Reports of impulses to action.* This section of the study has been previously reported (2). It refers to those aspects of the subjective experience of pleasure which are apprehended as impulses towards more or less specific activity. These impulses fall into four main groups:

(a) Pressure to express the pleasure by nonverbal gesture (e.g., laughing, crying);

(b) Pressure to engage in violent activity which is usually not goal-directed (e.g., jumping, dancing);

(c) Pressure to engage in social action (e.g., talking, competing);

(d) Increasing pressure to merge with the pleasure source and maintain the pleasure state.

5. *Reports of general energy level.* One aspect of the reports of the inner pleasure experience seems to be concerned with the status of available energy. Consistent elements of these introspective reports are comments such as:

> I feel weak and pliable,
>
> Stronger energies seemed to run all over my body.

The variations in energy level will be reported in a subsequent communication.

6. *Reports of sequence.* The inner-directed awareness of our respondents frequently perceived not only the inner events, but also a temporal ordering of these events. This kind of report presents the pleasure experience as an on-going process. This final category is the one we are primarily concerned with in this paper.

In order to determine the sequence of events in the pleasure process, all references to time sequence or to the ordering of inner events were extracted from the first 400 questionnaires returned. The extracts varied widely in the clarity and detail of their exposition. Some described the process in careful sequence; others merely implied that one or more inner events preceded or followed others.

For purposes of this analysis, the extracts were listed in descending order of completeness, i.e., those describing the greatest number of sequential events were listed first, then those describing fewer, and then still fewer, etc. The most complete descriptions were used to establish an arbitrary set of phases. The less complete descriptions were then plotted along this established course. In other words, the detailed descriptions established the sequence, and those which included fewer stages were used to amplify the phases to which they applied, to validate the order, and to indicate intermediate events.

Here, for example, is a description which gives a relatively full picture of the temporal order of events:

> The experience began with apprehension. Suddenly the apprehension vanished, and inside my chest—or maybe lower down—I felt a little bubble which seemed to be filled with an expanding gas. It made me feel wonderful—as if I were going to take off from the ground at any minute. From the bubble, faint vibrations began to pulse outward to my hands and feet. The bubbles grew larger and the vibrations stronger—larger and stronger—larger and stronger—until I thought I was going to faint. Suddenly, the bubble burst and—to my astonishment—I found myself weeping.

A less complete, but still full description is the following example:

> I first felt a dizzy sensation in my head. I felt as if I had been turning around and around. Then a tingly, chilly sensation originated in my spine and eventually (but very quickly) ran through my whole body. Afterwards a feeling a [sic] "well-being" flowed through my whole body.

A somewhat more limited description is:

> You have a little feeling that just bubbles over. It grows and grows until it almost chokes you. It seems after this little thing which has happened is over you still have the feeling of being part of it.

Here is a sparse extract:

> After this nervousness a warm feeling came and then relaxation.

TABLE 1

The experience began with apprehension.	Suddenly the apprehension vanished and inside my chest—or maybe lower down—I felt a little bubble which seemed to be filled with an expanding gas.	From the bubble faint vibrations began to pulse outward to my hands and feet. The bubble grew larger and the vibrations stronger . . . until I thought I was going to faint.	Suddenly the bubble burst and—	to my astonishment —I found myself weeping.
I first felt a dizzy sensation in my head.	Then a tingly, chilly sensation originated in my spine and	eventually (but very quickly) ran through my whole body.		Afterwards a feeling a [sic] "well-being" flowed through my whole body.
	You have a little feeling that just bubbles over.	It grows and grows until it almost chokes you.		It seems after this little thing which has happened is over you still have the feeling of being part of it.
After this nervousness	a warm feeling came			and then relaxation.

If the pertinent comments from the second description are extracted and placed in juxtaposition to the phases defined by the first, more complete, description, the foundation of a structure is established. If then the third description is used to amplify, validate, and correct the phases of the preceding three, the scheme looks like this (table 1).

In this way, working through the responses from more complete to less complete, the pertinent extracts from each were placed along the course of the hypothetical pleasure process established by reference to all the preceding responses. For purposes of this analysis, the 25 most detailed expositions of sequence were used.

Three general phases clearly emerged: a period of anticipation, a period of activation, and a period of deactivation. Obviously the duration of the *period of anticipation* depends partly on the nature of the precipitating event. This anticipatory period may be of brief duration, perhaps instantaneous, or may last some minutes. This does not mean that anticipation of pleasure may not last a considerable period of time. It means that people include as *part* of the pleasure experience itself the last moments of anticipation. This preparatory stage is a period of uncertainty. It represents varying combinations of hope for satisfaction and fear of frustration. The issue is still in doubt—pleasure or pain—and this is a trial period during which the organism prepares itself, by preliminary thought, to deal with either.[3] The phase is therefore characterized by inner experiences appropriate to both painful and pleasurable states. There can be any combination or alternation of sensations such as "apprehension", "nervousness", "fast heart beat", "relaxation", "excitement", "thrill", "beginning elation", "alternating cold and hot flashes", "longing". It must be repeated that no single response contains a complete exegesis of this adaptive maneuver. For some, the preparation for possible disappointment is emphasized ("At first my entire body was very tense and I was very nervous. My heart was beating very fast."); for others the preparation is for satisfaction ("I was excited and thrilled and I looked forward to the experience eagerly."). Some show a clear mixture of both ("My mind was at rest and I was almost com-

[3] This dual aspect of anticipation is reflected in common speech usage where one may refer to anticipation by saying, "I am *eager* to . . ." or "I am *anxious* to . . .," the former implying pleasurable expectation and the latter implying fear.

pletely relaxed [I was just a little bit nervous]."); while others do not describe this phase at all. On the whole, this is a short period of great tension.

In some instances, because of the sudden presentation of circumstances, or the subject's sudden awareness, he has very little time for preparation. It appears that preparation is nevertheless necessary, and although the situation has already presented itself, the organism, under great pressure, takes "time out" for adaptation. This is indicated by the over-all shock effect characterized by a state of turmoil in which the full impact of the pleasure situation is warded off momentarily while the subject orients himself. It is as though he is suddenly overwhelmed by the flood of conflicting emergency and welfare emotions. The general picture is one of shock, dizziness, and confusion, thus:

> Telegram arrival. Short breath, trembling hands, eyes blinking. Head shakes. Swallows, gasps. Voice, "No!" (Alone in a room) "It just can't be." Disbelief. "It can't be. This is too good!" Tears. More gasps. Disbelief. "My luck can't have turned. This just must not be true!" Rereadings aloud, over and over. Eyes blink. Comprehension seems not to check in the mind. Laughter, however [sic], a quick breath. Inner lift. Head throws back. Voice. "Good." "No, No. Not only good. Wonderful! Wonderful! . . ."

The above description graphically portrays the effort to avoid confronting the pleasurable reality until the subject is prepared, and then the sudden acceptance when that preparation is completed. This situation, where the nature of the circumstances (or the subject's reluctance) precludes an adequate period of anticipation, is analogous to other situations where the organism is suddenly confronted with the necessity for rapid and complete reorientation, for example, in the patients with brain injury studied by Goldstein (3). The initial reaction which strains the adaptive resources is therefore truly a "catastrophic reaction" (3), even though it may offend common sense to regard pleasure as a catastrophe. The same phenomenon may be seen in schizophrenics who, with an integrative pleasure deficiency, are less adequately equipped to cope with pleasure experience (6).

Since the preliminary, anticipatory, phase represents a preparation, and most particularly involves the adulteration of pleasurable expectation by emergency emotions, there comes a fairly well-defined point when this stage must end. In other words, the preparation is at some point adequate, and the issue of painful or pleasurable expectation is settled by the advent of the anticipated circumstances. There is, consequently, a rather sharp division between the initial phase and the succeeding phase. In the descriptions of this subjective experience, the advent of the *activation phase* is often signaled by the use of the word "sudden", and such remarks as "apprehension vanished" or "sudden calm" indicate a resolution of the uncertainty of the initial stage and the imminence of hoped-for satisfaction.

The preparatory phase and the transition to the activation phase are clearly demonstrated in this description:

> I was all nervous inside. My pulse and heart beat had increased in speed. When the doorbell rang I had a momentary flash as if I had put wet hands on an electric outlet. I had a cold shiver go up my spine and then a warmer one. Upon opening the door every muscle and bone in my bone [sic] seemed to have an aching sensation and longing feeling. *I instantly began to feel calm, warm inside, and at peace with the world.* [Author's italics.]

What happens then? As in the last sentence of the quotation above, the sensations of the initial phase are replaced by relaxation and inner warmth. The relief and relaxation described as signaling the resolution of the preparatory stage are accompanied by the apparently simultaneous awareness of one or more of the sensations of warmth, inner pressure, lightness, and vibration:

> Then I got all warm inside.
>
> I felt my heart getting bigger as if it would get so big and bust.

and

> It is a warm wonderful sensation that keeps growing and growing.
>
> I first had a soaring sensation, as if my entire spirit had been lifted out of the depths of my being.
>
> You have a little feeling that just bubbles over.

These sensations then increase in intensity, become more diffuse rather than localized, and the subject becomes aware of a feeling of confidence, strength, mastery. At the same time there may be a beginning loss of time sense.

> That temporary setting had no time bounds. It seemed eternal.
>
> Once the feeling started, I felt as if there were really no problems in the world and that I could do most anything. . . .
>
> These feelings all join in combination and build up rapidly in crescendo as at the heighth [sic] of a symphony.
>
> . . . and a great surge of overconfidence [sic] comes over me. . . . All of these feelings build and mount. . . .
>
> It grows and grows until it almost chokes you.

A curve representing the increased intensity of the feelings characteristic of this stage would show a great variation in height and duration. There can be a slow or rapid rise to a climactic peak of sensation; the peak itself can vary in height and duration, etc. The following quotations demonstrate some of this variety:

> . . . build up rapidly in crescendo as the heighth [sic] of a symphony and then taper off.
>
> My feelings . . . continued throughout the experience with no let-down occurring.
>
> All of these feelings build and mount, until I feel as if I would burst with joy.
>
> . . . no gradual building up of feelings. All seem to be present at once, no awareness of decline of great joy. . . .
>
> This went on for a period of about 2 weeks—and all the while I thought I would burst.

The decline is also more or less precipitous.

The last, or *deactivation*, stage is that part of the pleasure experience following the peak intensity of feeling. It usually corresponds to the period immediately following the end of the external event which precipitated the pleasure. In this phase, pleasure sensations are associated with marked relaxation and some degree of elation, as well as with feelings described in terms of satisfaction and content:

> After, while walking home, I felt . . . ready to take off (float) any minute.
>
> Afterwards a drowsy pleasurable feeling remained.
>
> Afterwards a feeling a [sic] "well-being" flowed through my whole body.
>
> . . . leaving a satisfied feeling.
>
> After the experience itself was over I felt a very warm, satisfying feeling and was completely happy and content with life.

This deactivation stage also has a widely varying duration. Its termination is often indicated by such terms as "back to life", "back to reality", emphasizing that the entire pleasure experience is felt as an interlude. There is, however, a clear carry-over even after the pleasure experience is completed, as though something had been added:

> And a sort of fulfillment and accomplishment rested on my mind afterwards.
>
> However, after peak feelings, state of well-being and happiness continues only I am once more functioning in the surroundings and aware of all again.
>
> The wonderful, relaxed, as well as energetic feeling however began to wear off little by little until after about fifteen minutes I was sort of back to reality again.
>
> It seems after this little thing which has happened is over you still have the feeling of being a part of it.
>
> Somehow although I knew it would end I felt as if I had this forever—a feeling of an eternal knowledge of something wonderful that I would carry with me into oblivion.

Table 2 summarizes the characteristics of the stages described.

Study of the process outlined in table 2 provides an over-all view of a sequential response which we have been describing piece by piece. When the described elements are placed side by side, in temporal order, there emerges a clear picture of an organismal "event". This event starts when the individual is confronted by circumstances with a strong pleasure potential.

The organism responds by immediate preparatory reactions, gearing it to cope with (gain) the hoped-for pleasure or, in the event of failure, the feared disappointment. This preparation, probably accomplished by trial-action in anticipatory thought, is reflected by a combination of sensations representing the welfare emotions (appropriate to the hoped-for pleasure) and the emergency emotions (appropriate to the feared disappointment).

When the circumstances indicate that the hoped-for satisfaction is imminent, preparation for frustration becomes irrelevant, and there is a disappearance of emergency emotions and an acceptance of pleasure sensations (feelings of inner warmth, inner fullness and pressure, vibration, and exhilaration). As the organism

TABLE 2.—SEQUENCE OF EVENTS IN THE PLEASURE PROCESS

Stage	Anticipation	Activation			Deactivation
Phase	Preparatory	Initial	Buildup	Peak	Integrative
Subjective quality (awareness)	Combination of sensations reflecting both emergency and welfare emotions, pleasurable sensations plus painful sensations.	Rather sharp onset characterized by decline or disappearance of emergency emotions and acceptance of pleasure sensations.	Gradually increasing intensity of pleasure sensations which became diffuse rather than localized. Beginning feelings of confidence, strength, mastery. Beginning loss of time sense.	An extension of the previous phase. The sensations are at their greatest intensity, are most diffuse. There is maximum "involvement" in pleasure and maximum loss of contact with extraneous reality.	Decline from the peak is rarely abrupt, usually gradual. This phase, and the subjective pleasure experience itself, is concluded by renewed contact with and involvement in extraneous reality, a shift in, or return to, time and place orientation. There is a residual pleasure-effect of "something added".
Specific sensations	Tachycardia, apprehension, excitement, elation, thrill, dizziness, confusion.	Relaxation, inner warmth, lightness, vibration, inner fullness and pressure, exhilaration.	Sense of withdrawal from irrelevant or contradictory aspects of reality (incl. time). Increase in all sensations of previous phase, especially the sense of inner fullness and pressure.	Height of all sensations of the initial phase of the activation stage, plus a sense of "flow" and diffusion involving entire body. Sense of loss of contact with reality.	Fulfillment, accomplishment, satisfaction, content, well-being, relaxation, security, warmth, calm, drowsy.
Interpretation	Preparation for dealing with (adapting to) either hoped-for satisfaction or feared disappointment.	The preparation is adequate and the external circumstances have resolved the issue so that satisfaction seems imminent.	This is the actual adaptive response to satisfaction and a preparation for satiation.	The response to satiation or the adaptation to whatever combination of satisfaction-frustration the experience provides.	The cessation of active interaction with the pleasure source and the adaptation to the new state in which something which was added has now to be integrated.

TABLE 3.—THE PLEASURE PROCESS AND THE PLEASURE FEED-BACK

Stage	Anticipation	Activation			Deactivation	
Phase	Preparatory	Initial	Build-up	Peak	Integrative	
Pleasure process	Preparation for adapting to satisfaction or frustration.	Preparation for and beginning acceptance of satisfaction.	Increasing response to satisfaction and preparation for satiation.	Maximum response to satisfaction or satiation.	Gradual decline of active response, integration of experience by retrospective thought.	
Pleasure feed-back		Sensitizing and alerting.	Reaching for and being drawn to.	Merging with, absorbing, and being absorbed.	fastening on and holding.	trying recapture.

absorbs the satisfaction, these feelings spread peripherally through the body, increasing in intensity. Concomitantly there is a progressive withdrawal of attention and interest from those aspects of reality which are extraneous or contradictory to the pleasure trend. At some point, this process reaches its maximum intensity, and there is added a feeling of confidence, strength, mastery.

The peak intensity is more or less sustained,

and decline from this peak is more or less gradual. The decline represents the cessation of active interaction with the pleasure source from which the organism has extracted more or less satisfaction. There is, consequently, a relaxation and a sense of satisfaction and accomplishment. The accomplishment, the satisfaction successfully achieved, is then integrated, partly by repetitive pleasure activity in retrospective thought. Concomitant with this phase there is a freeing of attention and interest for reality extraneous to the pleasure situation.

In a previously reported phase of this investigation (2), a study was made of that part of the subjective pleasure experience contributed by awareness of impulses to action. Although the emphasis was not on temporal sequence, there emerged a picture of a process labeled "the pleasure feed-back" or "the to-have-and-to-hold sequence". This consists of a series of impulses to activity in the following order:

sensitizing and alerting—active receptivity →
reaching for and being drawn to the pleasure source →
merging with, absorbing, and being absorbed →
fastening on and holding →
trying to recapture.

If this sequence is placed in the context of the sequence derived from the study herein reported, it can be seen that it represents congruent pictures delineating, in one case, the more active aspects, and in the other instance, the more passive aspects of the process. Table 3 illustrates this relationship.

Summary

1. Descriptions of subjective pleasure experiences were analyzed to establish the temporal sequence of inner events.

2. This sequence provided a picture of a process of adaptation to pleasure experience.

3. The process can be described in three stages:

A. Anticipation: preparation for hoped-for satisfaction or feared disappointment.

B. Activation: preparation for and response to greater or lesser satisfaction.
   (1) Initial phase: resolution of anticipatory stage and beginning acceptance of pleasure sensations.
   (2) Build-up phase: increasing intensity and spread of pleasure sensations.
   (3) Peak phase: maximum intensity and diffusion of pleasure sensations, maximum loss of contact with extraneous reality, feelings of strength and confidence.

C. Deactivation (integrative phase): usually gradual decline of pleasure sensations; sense of relaxation, satisfaction, accomplishment; renewed contact with and involvement in extraneous reality.

4. This process seems to represent another dimension of the process elucidated by study of the action impulses in the subjective pleasure experience (2).

Bibliography

1. Buchenholz, B.: Pleasure—Preliminary report of an investigation. *J. Nerv. & Ment. Dis., 123:* 351-355, 1956.
2. Buchenholz, B.: The motivating action of pleasure. *J. Nerv. & Ment. Dis., 124:* 569-577, 1956.
3. Goldstein, K.: *The Organism.* New York: American Book Co., 1939.
4. Rado, S.: Adaptational psychodynamics: A basic science. In *Changing Concepts of Psychoanalytic Medicine.* Ed. by Rado, S., and Daniels, G. New York: Grune & Stratton, 1956.
5. Rado, S.: Mind, unconscious mind, and brain. In *Psychoanalysis of Behavior.* New York: Grune & Stratton, 1956, p. 180.
6. Rado, S., Buchenholz, B., Dunton, H., Karlen, S., and Senescu, R.: Schizotypal organization. In *Changing Concepts of Psychoanalytic Medicine.* Ed. by Rado, S., and Daniels, G. New York: Grune & Stratton, 1956.

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COURSE IN THE INDIVIDUAL PATIENT AS TRACED IN THE SIX SCHIZOPHRENIAS[1, 3]

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The Orthogenic School in the University of Chicago is a treatment residence for children with very severe personality disorders. Most of the children reside there for a number of years. It has therefore been possible to study them over a time period. Clinical evaluations are constantly being made routinely and recorded. Rorschach tests are obtained for many of them at intervals of varying length. The Director of the School calls for the test when in his judgment the child is passing some definite phase. Thus we are able to compare a child's clinical behavior at these time points with the Rorschach test indications, appraise the interim changes, and draw inferences for prediction. Knowing what the course has actually been we use this knowledge, in retrospect to be sure, towards establishing the predictive worth of the findings up to any time point. Course and prediction are judged by means of a "trait universe" of 170 behavior items selected for their significance in patterning out schizophrenia. (More about this list, below.) The present paper traces in detail the course of one schizophrenic boy, studied by these methods over a period of 5 years and 8 months.

This boy, whom we are calling Eddie, offers the advantage of having been studied extensively and reported in other publications. He is John of "Ice Cream is Better than God", in Bettelheim's illuminating reports on children in the Orthogenic School (4); and he is also the Eddie whose three Rorschach test patterns were previously analyzed in detail by one of us and published earlier (1). These were the three test records used in the investigation we are reporting here. The tracings will have significance, we think, for some issues that are being much pondered by students of schizophrenia. One of these concerns that nebulous cluster of patients who, as judged clinically whether from their histories or visible symptoms, are neither schizophrenic nor non-schizophrenic. Hoch and Polatin (8) describe and designate them as "pseudo-neurotic". Zilboorg (13) refers to them as "borderline", "transitional" or "intermediary", and includes them among his "ambulatory" schizophrenics. He caustically notes the "chaos", the "penumbra", and much confusion about clinical differential criteria. He also points up the difficulty, except in advanced conditions, of identifying Bleuler's "primary disorders" since the picture as it presents itself to the clinicians usually consists of only the "secondary" symptoms. And from these, the diagnostic reasoning can, it may be added, lead in more than one direction.

The reality of the "pseudo-neurotic" pattern receives emphasis also in a correspondence between Johnson and M. Bleuler, published by the American Journal of Psychiatry (9). In his letter, Bleuler lays especial stress on the much larger issue of defining schizophrenia generally. He would restrict the term to disturbances that have progressed to the point of psychosis, and he suggests more precise terminology ("latent schizophrenia", "conditions indicating incipient schizophrenia", "socially adjusted schizophrenia", among others) for disorders that are concealed in the overt clinical picture. Also he cites the elder Bleuler's authority for these suggestions (5). While unequivocally rejecting the "schizoid" designation as not referring to what is involved in schizophrenia, he accepts the Hoch-Polatin concept of "pseudoneurotic schizophrenia" as a "condition which is schizophrenia essentially, but in terms of social adjustment has not reached the level of a schizophrenia but

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simply that of a neurosis." Again he cites the authority of his father.

The problems articulated by Zilboorg, in the Bleuler-Johnson correspondence, and recurring in numerous other writers, both American and European, have a familiar ring to the present writers. Molish in a 1956 monograph (10) cites the literature more extensively and reports an extensive research in schizophrenia among naval recruits. The frequency of the pseudo-neurotic (8) variety especially impressed him, and his results are thus empiric evidence for this condition. In a recent communication Molish and Beck (11) presented more research results supporting this concept. In an earlier monograph Beck (2) describes findings which bear on the questions explicit or implicit in the above cited writings: the questions of recognizing schizophrenia, of estimating the degree of the patient's involvement, of the possibility of predicting the course, of a dividing line between schizophrenia as latency and as psychosis. He graphs some of his results in a briefer communication (3). The "trait universe" devised for investigating schizophrenia has been the core of our method in these investigations. A flexible instrument, it enables the investigator to avoid the pitfall (bemoaned by Zilboorg) of fitting a patient into the hard and fast differentiations of the textbooks. It is adaptive to the individual schizophrenic, penetrates to such affective fluidity as he has, to his intellectual maturity and integration, to his defensive poses and strategies, and to the adequacy of his social adaptation.

Eddie entered the Orthogenic School at the age of 5 years 7 months. He was 7 years 9 months old when his first Rorschach test was administered, or after he had resided in the School 26 months but before Bettelheim had introduced his treatment program. The School had been under another administration for nearly two years after Eddie had entered it. The child had thus not yet at the time of his first Rorschach test been under the influence of the new treatment philosophy.

The source trauma for the boy's severe maladjustment is stated by Bettelheim in his opening paragraph.

> Eddie's severe difficulties in eating began on the seventh day of his life, when he developed a thrush mouth infection, which persisted uninterruptedly until his rehabilitation at the School was well under way. According to the hospital records the affliction was much better within two days, and mother and child left the hospital on the tenth day after his birth. Nevertheless, Eddie was fed by eye dropper for the following six months and his mouth was painted with gentian violet for the first eight months of his life. Eating was very difficult, even painful, for him, which placed a great strain on those who took care of him. From the very beginning he experienced neither the pleasure of sucking nor the feeling of satisfaction, since the small amount of food he could take at a time was not sufficient really to quell his hunger (p. 271).

Again, at the age of three and a half, while still living at home, he suffered an accident which again caused a mouth trauma; he fell while carrying a clothespin and it

> penetrated through his lip and up into the roof of his mouth, lancing the gum. . . Eddie reverted to the worst type of feeding difficulties. There were nausea, gagging, and vomiting at every meal and the parents, in their anxiety, once more relied on forced feeding. Each meal again became an excruciating and exhausting battle (p. 283).

The following phrases and excerpts taken out of Bettelheim's book tell more about Eddie for a period of about two years beginning at the time of the first Rorschach test.

> His extreme negativism . . . withdrawal from and rejection of the total world . . . . He never played actively, as did other children, was forever catching cold, and always looked very sad and unhappy. When he responded to the world at all, it was by whining. He gagged frequently, especially when he saw food . . . . He was so homely and dishevelled, so repellently smeared with spittle, mucus, and dirt, and wore so hostile an expression.
>
> He masturbated openly and often. He seemed lost in daydreams all the time. If spoken to, he quickly went through the pretense of doing what he thought was expected of him, and put on a great though purposeless show of being busy. After a minute or two, during which nothing was accomplished, he again relapsed into day-dreaming.

In judging his condition at any time, or changes of condition, the units of measure will be six schizophrenic reaction types that were obtained in one of the former researches (2). Each of these six schizophrenias is a description by means of a trait list or "universe" of 120 items. We have since revised that list, and the present trait sample of 170 items is designed so as to permit a sorting of all degrees of deviation along a continuum of personality struc-

ture extending from the hypothetical "normal" to most severe degrees of disruption. The new items were so selected as to meet the conditions of the Q technique set up for the 120 item universe and of the conceptual scheme derived with it (p. 132).[4] Stephenson whose method we are following (12) and who had worked with us in drawing up the older trait sample aided us in constructing the present one.

The essence of this instrument is threefold: (a) it contains items derived from those behaviors which the psychiatrists had listed as characterizing schizophrenia of various kinds and degrees and from which the first (120) trait set was constructed. It includes thus the raw "sense data" found in observing schizophrenics clinically and can thus identify schizophrenia. (b) It includes also less pathologic traits. As in the original trait universe (c) all items are referable to an underlying psychodynamic force or as we prefer to call them "source trait", borrowing from Feigl (6). These dynamics or source traits composing the conceptual scheme (above) are: the defense organization, intellectual functioning, fantasy activity, social adaptation, emotional state (p. 132). The psychoanalytic rationale in them will be recognized.

It was against a perspective of each of the six schizophrenia reaction patterns, so derived, that Eddie was viewed by investigators trained in different disciplines: the School's Director, its counselor staff, a psychiatrist, two psychologists using the Rorschach test. Each observed by means of his own technique, but all translated their findings into and rated them in the terms of our 170 trait items. We then correlated the ordinal position of each item as fixed by each investigator with its positions in each of the six schizophrenias. I am restricting myself here to the results obtained by one psychologist.[5] His results for Eddie's first Rorschach test are shown in table 1.

First to arrest the attention are the high correlations with four of the six reaction patterns. For any one correlation within the range .58 to .72 the inference is warranted that Eddie's behavior has much in common with the behavior that goes into any one of those patterns. The four high correlations reinforce the evidence yielded by any one; this boy must have much schizophrenia in him. The trait description serves thus the purpose of recognition. It helps establish the fact of schizophrenia.

TABLE 1.—Correlations of Ratings by Pst-2 for the First Rorschach Test with the Six Schizophrenias

Reaction Pattern	S 1	S 2	S 3	SG	SR 1	SR 2
Rorschach 1.....	.72	.61	.04	.58	.63	.31

A second important meaning emerges in these four high correlations, as contrasted with the two lower ones, those with S 3 and SR 2. The four are the schizophrenias more obviously characterized by behavior items indicating severe intellectual dysfunction. S 3 on the contrary is characterized by rigid outer control. SR 2 is a relatively stabilized condition displaying only moderate regressive trends. The interpretation is: Eddie is not at present selecting the schizophrenia which utilizes rigid control, and showing only a small trend towards the other, overtly less disordered, condition. He is living by disorderly and disruptive patterns.

How seriously ill this child was during this phase may be gleaned from the fact that in our Michael Reese Hospital investigations neither S 1 nor S 2 was found in any child under age 11. Eddie broke through this rule, he was only 7 years and 9 months old at the time of his first Rorschach test. Yet, as an S 1 he was already in the "relatively progressed condition of the disease", which we see in this pattern and in S 2 (p. 145). At the same time this boy's seriously disordered behavior reported by the School's staff supports our original finding that S 1 and S 2 are progressed reaction patterns.

Another index to the degree of the involvement, qualitative rather than quantitative, is obtainable by reading the trait items themselves that rank highest in this Rorschach test description of Eddie. The first 12 disclose infantile or very regressed behavior.

[4] All page number references, in the rest of this paper, unless otherwise designated, are to Beck's 1954 Monograph (2).

[5] The psychologists were Molish (Pst-1), and Beck (Pst-2). The other investigators were Bettelheim designated below as Dir; the psychiatrist Doctor J. K. Kavka (Prt); and two of the School's counselors Miss Charlotte Fowler (C-1) and Miss Florence White (C-2).

14. Association is disrupted: perplexing and often confused statements.
78. Inadequate reality testing.
103. Either gives the same level of feeling tone, or dominated by one prevailing affect.
118. Confused, illogical thinking.
3. Patient rejects the environment.
22. Excessive irritability.
26. Impulsive, unstable in reaction to usual life stimuli.
30. Little intellectual control over basic drives.
96. Thought processes are regressive.
160. Amoral—unmindful of social mores.
161. Hypersensitive.
164. Uncontrolled energy distribution.

The underlying or source traits of which these behaviors are the outer manifestations are: intellectual dysfunction (ego impairment) in items 14, 30, 78, and 96, and emotional state, labile, 22, 26, 30, 103, 161 and 164; and 3, 160, accenting, in his social adaptation, a trend to self-absorption.

The next and most critical question is: what prediction can be made from the correlations between Eddie's reaction and the six schizophrenias? and from the degree of his involvement in each? The figures, cold numerals as they are, are richly pregnant in significance as to course.

His four high correlations are: with S 1, .72; S 2, .61; SG, .58; SR 1, .63. In the discussion of prediction in the monograph (p. 191) S 1 and S 2 are listed among the patterns "more likely to remain stable", and again they are "stable, or unchanging schizophrenias". Eddie's high correlations with S 1 and S 2 lead to the conclusion therefore that he is certain to remain in a severely immature state, one that includes characteristics of both these patterns. However, on the same page the monograph holds that two of the schizophrenias "are certain to change." These are SG and SR 1, the other two with which Eddie correlates highly. There is thus a discrepancy among our findings in this patient. He commits that sin which investigators in any field so frequently meet with in individual specimens: he refuses to follow the textbook. As S 1 and S 2 Eddie cannot change; as SG and SR 1 he must change; and Eddie is all four.

The discrepancy is based in the additional fact that Eddie, under eight years old, is younger than the minimum age (11 years) for which we found S 1 and S 2. This, his comparatively very young age, necessitates caution and actual delay in predicting. In and by itself his younger age must point to the possibility of change. His correlating with SG and SR 1 needs at this time to be weighed equally with his doing so with S 1 and S 2. We cannot at this point more confidently predict from S 1 and S 2 than from SG and SR 1, and the age factor weighs the balance on the side of change.

The two schizophrenias in which Eddie's correlations were lower are S 3, .04; SR 2, .31. The essence of S 3 is the rigidity, stiffness, a defensive position taken up within fixity of reaction pattern. For the present, the correlation with S 3, essential absence of correlation, only tells us that he does not now employ it and leaves us without predictive information. With SR 2 Eddie does show the small but not insignificant correlation. This schizophrenia is a relatively favorable one as compared with the others (pp. 118–119 and pp. 192–193). In it the patients take up a position innerly more flexible than that of S 3. I have been calling it a "sanctuary schizophrenia". No prediction can be made from the present correlation of only .31. The question which it does raise is whether it is high enough to indicate any possible further development of this pattern.

Another factor here is that at the time of the first Rorschach the defenses appear to be by means of constriction. This is seen in the high correlations with SG and SR 1; in both of which the constrictive defenses are apparent. Hence even the acute phase of the illness is beginning to be modulated by constrictive ego defenses.

II

Eddie was administered his second Rorschach test 39 months after the first, when he was 10 years 11 months old and had been in the School a total of 64 months. At this time Bettelheim writes:

> (The) evaluation of Eddie, made during his fourth year in the School, and at the end of the second year of our work, disclosed that his fixation at the oral stage was basically unaltered. Eating remained an obsession, and a most painful one. Progress in meeting the world

in any way had been and still was terribly slow. Every activity remained fettered to the oral area. When the boys in his group were given new toy guns and pretended to shoot wildly at one another and at the counselor, Eddie could shoot his only if he aimed it directly at the counselor's mouth. Otherwise he could barely hold the gun, it seemed so heavy. But when he shot directly at someone's mouth, he could do so with an astonishing display of skill and aggressiveness. Eddie also had made some progress in permitting himself to regress, and to enjoy it, but he had not seemed to gain commensurate strength for striving toward more normal intellectual or motor achievements. His very limited progress in personal integration, too, was not in line with our hopes, (4; pp. 322–332).

The correlations between the six schizophrenias and the findings of Pst-2 for the boy's second Rorschach test are shown in table 2, and compared with those obtained in the first Rorschach test.

Eddie has changed. Also he has stood still. The sharp changes are in S 3, S 2 and SR 2. He has become markedly rigid (S 3). He has given up, seemingly altogether, the relatively composed SR 2 pattern and, to a considerable extent, the S 2 highly characterized by fantasy living. And, having tossed overboard SR 2 with its fantasy cushion he turns to that other sanctuary, S 3, with its costly self-encapsuling which shuts off not only the inner fantasy living but also outwardly expressed emotion, i.e., all inner experience. Intellectual control is necessary towards achieving S 3 but the apparent respect for reality gives a spurious picture. The favorable question it does raise is whether as sheer capacity for control, even though with severe narrowing of the mental life, it projects out activity of the ego, with the corollary of some latent strength. The picture is spurious. Eddie's present high correlations with S 1, SG, SR 1, so show. Much schizophrenic behavior and of at least three types still characterizes him. S 2 still contributes as the positive although small correlation shows. What he retains of it is the ego inadequacy manifest in disordered intellectual functioning which this schizophrenia shares with S 1, SG. SR 1. The high correlations with S 1, SG and, SR 1 tell also where Eddie has stood still; in the more severely disordered schizophrenias. They establish the fact of schizophrenia (recognition) and emphasize that the patient indulges himself in much of it. This condition is mirrored again in the twelve items rated highest in this second test. These are:

1. Stereotyped in thought content.
5. Breadth of interest (spontaneity) is narrowed.
8. Excessive repression (to a pathological degree) of gratifying images.
38. Permits himself little pleasure or enjoyment.
57. Withdrawal from social contact; but not into autistic fantasy.
58. Thinking is impoverished.
89. Perseveration prevents appropriate associations.
137. Inadequate with respect to social participation.
148. Interests are narrowed (relative to ability).
159. Has little understanding of the emotions of others.
160. Amoral—unmindful of social mores.
166. Attention indifferent to point of apathy.

The source traits are: defense, pathogenic (8), withdrawing (57); intellectual functions, as ego loss (1, 5, 58, 89, 148, 166); social adaptation, self-deprivation (38), self-absorption (137, 160); emotional state (159, 166).

Prediction can now be attempted from two sets of data: 1) Eddie's present status; 2) the *two* sets of correlations taken together. Having measures available for two points, can we plot, from the changes, the course that is to come?

The malignant look of the present findings is obvious. It is more so however in view of the fact that Eddie is now within the age at which S 1, seriously disordered condition that it is, remains relatively stable (p. 191). A discrepancy appears again, however, since he still correlates highly—in fact highest—with SG and SR 1, the transition types, those that always change. So again the paradox: he will not change (S 1) and he must change (SG, SR 1). It is the shifts in the correlations for

TABLE 2.—Correlations of Eddie's First and Second Rorschach Tests with the Six Schizophrenias

Reaction Pattern	S 1	S 2	S 3	SG	SR 1	SR 2
Rorschach I	.72	.61	.04	.58	.63	.31
Rorschach II	.55	.27	.42	.60	.70	.02

S 3 and in SR 2 that give a lead to the predictive course.

Concerning S 3 the monograph conclusion is (p. 144): "the child found in the S 3 reaction pattern is likely to stay in it; or to shift to the closely related and less brittle SR 2". In the present Rorschach test, the correlation with S 3 is moderately significant and positive, .42. In Eddie's first Rorschach test no correlation with S 3 was found. Thus he can, but will not as a matter of certainty, follow this pattern. Similarly with SR 2, he does not correlate with it in the second Rorschach test, but in the first he did to the extent of .31. A positive trend is here indicated. From the two test findings together the reasoning would seem warranted therefore that the boy does grope or reach for some stabilizing life pattern. In one of his phases he contracts into the impoverished mental life, sterile for any richness, of S 3. In another he turns to the more varied psychologic world together with its potential for the pathogenic, of SR 2. It is to be kept in mind that both provide the ego with shelter from the outside world and the troubles which it brings. From the Michael Reese Hospital researches the reasoning with reference to these two reaction patterns is: (p. 144) "If a child is found as of either SR 2 or 3, the chances favor he will stabilize in one of these two reaction patterns, characterized by overt control, but with loss of functioning; and not accessible to communication from the environment." The prediction that he will come to rest in one or the other of the two patterns can now be hazarded.

Therapeutic implications here emerge. The boy is to be aided as far as possible in giving up the S 3 pattern in favor of the SR 2. With the latter he can make some contact with his world and be innerly more relaxed.

III

Personality appraisals for Eddie were obtained a third time shortly before his discharge from the School. He was now 13 years, 5 months old and had been a resident in the Orthogenic School for 94 months. The correlations for the three Rorschach findings with the six schizophrenias are shown in table 3.

TABLE 3.—Correlations of Eddie's First, Second and Third Rorschach Tests with the Six Schizophrenias

Reaction Pattern	S 1	S 2	S 3	SG	SR 1	SR 2
Rorschach I	.72	.61	.04	.58	.63	.31
Rorschach II	.55	.27	.42	.60	.70	02
Rorschach III	.05	.15	.11	.12	.16	.30

The correlations for the third Rorschach test alone show that Eddie now uses least of the pattern with the most severe intellectual disruption, S 1. In fact he is not now an S 1 person. Secondly, he uses too little of the other four more malignant patterns to have significance. Judged from the correlations with these five patterns one could not speak of him as schizophrenic, or as only very little so.

However, SR 2 is now again positive. The correlation is a small one, and yet it well approximates the solution into which he has settled at this time point, as he was about to leave his therapeutic milieu. His ego is still, to the extent indicated in an SR 2 pattern, too inadequate to permit his exploiting his abilities healthfully. But also, to the measure of SR 2, he can follow a less regressed way of living. That is, as he is about to be discharged he is, over-all, in a more adjusted life pattern.

The correlations at the third time point are in themselves a prediction. They state, for one thing, that Eddie need not manifest severely schizophrenic behavior (the low correlations with S 1, S 2, SG, SR 1); and for another that he will be vulnerable in the degree portrayed by the pattern SR 2. He confirms the finding of our previous research: these children never completely abandon schizophrenia (pp. 143 and 192). The more difficult question is, can he be depended on to stay within the relatively comfortable SR 2? His history of high correlations with the more malignant conditions necessarily dictates greatest caution in answering this question. Certain it is that the latency for regression must always be there. The favorable outlook given in his SR 2, S 3 courses, is recapitulated in table 4.

The patient was seeking one of these self-protective patterns at each of the three time points. He was always groping for an anchoring spot.

The reasoning from these figures is a source of gratification in the light of a paragraph by Bleuler (p. 169) in discussing course. "In making the *prognosis* we have to differentiate

TABLE 4.—S 3 AND SR 2 CORRELATIONS WITH THE THREE RORSCHACH TESTS

Reaction Pattern	S 3	SR 2
Rorschach I	.04	.31
Rorschach II	.42	.02
Rorschach III	.11	.30

the 'direction prognosis' and . . . the 'extent prognosis' ". He exemplifies direction with "paranoid, catatonic dementia, etc." and concerning extent, the questions he posits are, "Will the disease soon come to a stop, or will there be some improvement? Will the patient become socially incompetent through dementia? Or will he be able to maintain himself in spite of the disease? And under what circumstances?" Our empirical method offers leads towards answering the very questions which are set up by Bleuler.

Directions of clinical course have meaning as prognosis; and prognosis, as index to the ability to change, enables the therapist to set a treatment goal. The logic in our figures is therefore pertinent to the critical question of how much treatment effort to invest in a person. This is the more critical in children since a natural growth potential is still available to them. Hirschberg and Bryant (7) advert to this matter of ability to change; and again, I believe, our correlations offer leads towards answering the questions they pose.

"Moreover, if the differential diagnosis allows us to distinguish between those clinical groups in which the adaptive pattern is irreversible, or is slowly reversible, or is potentially quickly reversible, then the individual evaluation of treatability can be made in each case with more prognostic clarity, with a greater acceptance of therapeutic limitations, with a smaller number of false expectations, with some awareness of the probable investment of time and money that will be required, and with some planning of treatment *goal* as well as treatment method."

Treatment plans are designed, however, less by quantitative rationale than by qualitative. What are the assets concealed under the overtly asocial or antisocial adaptations? the queer motor and language productions? the extravagant delusions or other beliefs? The answers to this question are available in our trait universe, but neither factor analysis nor any other quantitative method can detect them. Only a qualitative and painstaking scrutiny of the items—those which characterize the patient, whether by their presence or their absence—will do this. The trait list is adequate for this purpose because the substance in its items was contributed by a group of clinical psychiatrists (p. 8 ff; p. 54 ff). The items are therefore essence, diagnostically and therapeutically, of the everyday thinking and work habits by persons who must know this field at grass roots. Qualitative analysis of these items is constantly being carried on (Beck), but the emerging results and related thinking cannot form part of the present report.

Still one other set of correlations enables us to extract quantitative indications concerning the direction of the change in Eddie. These are the intercorrelations between the ratings for the 170 items in all the three Rorschach tests. They are shown in table 5. The reasoning from these figures is: the Eddie of the first Rorschach test resembled the one of the second test quantitatively. He did not, as he was at his first time point, resemble the boy in the third test. But the two patterns of the second and third points fail to resemble each other. It is seen then that although in the third test he turned away from the pattern of the second, he did not revert back to that of the first. He is now characterized by behavior items other than those in the first and second tests. The total reaction pattern is a different one.

Summarizing the psychologic implications in the correlations at the three time points: (a) The boy was in a gravely disorganized condition at the time when the School went under its present Director and treatment program. (b) He was severely constricted, "muted", at the second testing (38 months after the first). (c) He has given up all the more severe patterns as he is about to leave, 94 months after entering. To the extent that these findings are confirmed they are index to the possibility of

TABLE 5.—INTERCORRELATIONS FOR THE RATINGS OF ALL 170 ITEMS IN THE THREE RORSCHACH TESTS

	I	II	III
I		.54	−.04
II	.54		−.08

applying quantitative method in identifying a condition, plotting a course, and estimating treatability.

IV

The inferences from the correlations with the six schizophrenias necessarily depend for their validity on the soundness of the data from which the coefficients are derived: the ratings by Pst-2 in each of the 170 items. One way of judging these ratings is by comparing them with those of other investigators Our research design does call for rating each patient by more than one investigator. The number of these varied from one child to the other. The other psychologist (Pst-1) also made his judgments exclusively from the three Rorschach tests which were the sole material used by Pst-2. The two sets of psychologists' data are therefore strictly comparable.

TABLE 6.—Correlations of the Several Ratings with Each of the Six Schizophrenias at Various Time Points

Reaction Pattern	S 1	S 2	S 3	SG	SR 1	SR 2
When Eddie was 7 years 9 months old. Treatment begins.						
Observer						
Pst-2, Rorschach I	.72	.61	.04	.58	.63	.31
Pst-1, Rorschach I	.58	.50	.21	.67	.61	.35
Prt as of time of Rorschach I	.12	.23	.13	.15	.21	.30
Dir as he first knew Eddie	.48	.31	.27	.50	.26	.22
When Eddie was 10 years 11 months old. Under treatment for 38 months.						
Pst-2, Rorschach II	.55	.27	.42	.60	.70	.02
Pst-1, Rorschach II	.57	.16	.45	.79	.71	.18
Prt as of time of Rorschach II	−.02	.22	.01	.06	.06	.28
When Eddie was 13 years 5 months old. Under treatment for 68 months.						
Pst-2, Rorschach III	.05	.15	.11	.12	.16	.30
Pst 1, Rorschach III	−.05	.08	.06	.09	.10	.32
Prt as of time of Rorschach III	.34	.29	.29	.40	.40	.38
Dir as he last knew Eddie	.10	.03	.26	.06	.16	.16
C-1	.21	.26	.26	.30	.30	.38
C-2	.43	.36	.22	.48	.41	.31

The data which the other investigators rated were not closely enough comparable. The psychiatrist was not the one who had treated Eddie and did not know him personally. He obtained his information entirely from the School's files. These are very detailed and a faithful record of the boy while at the School. They do enable a trained observer to make his ratings with confidence, mixed to be sure with a dose of apprehension that goes to make up a conscientious observer. He prepared three sets of Q ratings, one for just about the dates of each Rorschach test. The School's Director (Bettelheim) knows the boy very well as his report on "John" shows. He felt, however, that he could not extrapolate himself precisely to any given time point. He could with confidence give us a rating of the boy as he first knew him, and as he last knew him, when Eddie was leaving the School. The observers who probably knew him best are the two counselors, both women. It is the counselors in the School who care for a child throughout his waking day, and come closer to him than any of the professional personnel. But this intimate acquaintance turned out to be, in part, a handicap. They knew the child *too* well. They could not separate him out for what they knew him to be at one rather than another time. To them he was the one child, one who had changed and grown in the approximately six years during which they knew him in the School. All the less could they fix Eddie's personality as of any particular time point. Each therefore rated Eddie as she knew him, a fused personality. The ratings by these observers are then the other "variates" we have of Eddie. Each of these was correlated with each of the six schizophrenias. How all these correlations compare with those of Pst-2 can be seen in table 6.

These various correlations are here presented with no thought that they are evidence confirming or refuting the findings of Pst-2, but with the purpose of reporting our data in full.

Finally, the findings for only one child are being reported in this paper. The question is in other whether the method is generally applicable. In our research it has been used in fifteen of the children, boys and girls, forming the core group in our total of fifty-two children in the School whom we studied. The available data do not duplicate those obtained for

Eddie. It was not always possible to have psychiatric study at various time points or to obtain more than one Rorschach test. The circumstances of each child's stay in the School necessarily shape our study. However, I cannot indulge myself the luxury here of analyzing the correlations for each, as I have done for Eddie. The results for him do exemplify what is coming out of these researches as ingress into the as yet obscure territory of childhood schizophrenia.

Summary

By the method of correlating findings in a schizophrenic boy, with six schizophrenic reaction patterns, this report traces the boy's course over a period of 5 years 8 months, during which he was resident and in treatment in the Orthogenic School of the University of Chicago. As he is about to leave the School, his is a picture with obvious vulnerable spots but with clearly more stable personality organization than 68 months earlier.

The significance in this tracing is that it is (a) description accurate and adequate for schizophrenia because it is in terms of the clinical psychiatrists' observed "sense data" of schizophrenia; which (b) have meaning in terms of personality theory since all the data are deduced as work of underlying source traits hypothesized in an innerly logical personality theory (psychoanalytic). So by applying correlational techniques to the ratings of many items, we are (c) correlating not items but whole human beings; the whole person which our boy of this study is, correlated with the typical whole person represented by each schizophrenia.

The value of the method is that it enables a valid and flexible approach towards knowing the patient. The numerous items and the fine nuances of difference among some not only trace out the schizophrenia but also make possible the mirroring of assets which are usually obscured under the malignancy-connoting label "schizophrenia". They are views of the patient not only in his worst trends but also in his better potential. A treatment effort concerned with preventing further decline of the personality, and with restoring the patient to the sufficiency made possible by his resources is aided by such scrutiny of the adaptive assets.

Bibliography

1. Beck, S. J.: *Rorschach's test.* Vol. III: Advances in interpretation. New York: Grune and Stratton, 1952.
2. Beck, S. J.: The six schizophrenias. Research Monograph No. 6, The American Orthopsychiatric Association, New York, 1954.
3. Beck, S. J.: The role of the clinical psychologist in the evaluation of children with specific handicaps, pp. 434–448. In *Neurology and Psychiatry in Childhood.* Vol. XXXIV of the Proceedings of the Association for Research in Nervous and Mental Disease, 1954.
4. Bettelheim, B.: *Truants from Life.* Glencoe, Illinois: Free Press, 1955.
5. Bleuler, E.: *Textbook of Psychiatry.* Transl. A. A. Brill. New York: Macmillan, 1930.
6. Feigl, H.: Principles and problems of theory construction in psychology, pp. 179–213. In *Current Trends in Psychological Theory.* Pittsburgh: University of Pittsburgh Press, 1951.
7. Hirschberg, J. C., and Bryant, K. N.: Problems in the differential diagnosis of childhood schizophrenia, pp. 454–561. In *Neurology and Psychiatry in Childhood.* Vol. XXXIV of the Proceedings of the Association for Research in Nervous and Mental Disease, 1954.
8. Hoch, P., and Polatin, P.: Pseudoneurotic forms of schizophrenia. *Psychiat. Quart., 23:* 248–276, 1949.
9. Johnson, H. K. (in correspondence with Bleuler, M.): The concept of schizophrenia. *Am. J. Psychiat., 111:* 382–383, 1954.
10. Molish, H. B.: Schizophrenic reaction types in a naval hospital population. Bureau of Medicine and Surgery, Navy Department, 1956.
11. Molish, H. B., and Beck, S. J.: Further explorations of the six schizophrenias. Read before the American Orthopsychiatric Asscoiation's thirty-fourth annual meeting, Chicago, 1957.
12. Stephenson, W.: *The Study of Behavior: Q-technique and Its Methodology.* Chicago: University of Chicago Press, 1953.
13. Zilboorg, G.: The problem of ambulatory schizophrenias. *Am. J. Psychiat., 113:* 519–525, 1956.

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A MODERN CONCEPT OF FOLIE À DEUX

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That Folie à deux exists as a clinical entity has been generally accepted from the time it was first fully described under the heading of "Folie à deux ou folie communique" by Laseque and Falret (18) in 1877. However, despite the numerous papers which have been published on this interesting subject, there has been little concretely established as to its nature and pathogenesis which can be accepted in the light of present day psychodynamics. In Noyes' *Modern Clinical Psychiatry* (20), Folie à deux is defined as, "a mental disorder in which mental symptoms, particularly paranoid delusions, from which one of two persons intimately associated with each other, usually for years, is suffering, are communicated to and accepted by the other". "In nearly every instance the delusional ideas are dropped by the recipient if he is removed from association with the dominant person". Bleuler (4) states, "It happens that paranoid or paranoic and rarely hypomanic patients not only can make those with whom they live close together believe in their delusions, but they so infect them that the latter under conditions themselves continue to build on the delusion; at all events they remain blind when confronted with the contradictions from reality, they have the same deceptions of memory and eventually even illusions and hallucinations as the one who became afflicted first and pass through paranoid and hysteroid excitements". "Through timely interference, i.e., a separation from the diseased focus, most of the induced cases can rapidly be cured". In 1942 Gralnick (9) published what has come to be the definitive paper on this subject with a total review of the English literature and a compilation of the 103 cases reported up to that date. He divides Folie à deux into four categories: 1) Folie imposée (Laseque and Falret, 1877), the delusions of a psychotic person are transferred to a mentally sound person following intimate association free from counterbalancing forces. These delusional trends are not elaborated by the second person and tend to disappear as soon as the two are separated; 2) Folie simultanée (Regis, 1880), the simultaneous appearance of identical psychoses in two markedly predisposed persons, usually having a long intimate association; 3) Folie communiquée (Marandon de Montzel, 1881), the transference of delusions, but only after a long resistance. Here, it is felt that the delusions are maintained even after separation; 4) Folie induite (Lehmann, 1885), new delusions are added to those of a patient under the influence of another patient.

As regards etiology, various beliefs have been put forward. Identification is perhaps the most commonly presented pathologic mechanism; Deusch (6) states, "I believe that close living together from the beginning is an expression of those unconscious bonds which later bring both parties to similar delusional ideas; the common delusion appears to be an important part of an attempt to rescue the object through identification with it or its delusional system". Marked hereditary predisposition as an etiologic factor was originally proposed by de Montzel and more recently by Kallman and Mickey (11, 12), Adler and Magruder (1), Craike and Stater (5). Since Folie à deux so frequently involves members of the same family, it is easy to understand how this theory has come into being. Environmental factors have also been proposed chiefly by Gralnick (8): "Mental illness is man's active response to markedly disturbed human relationships, and in psychosis sociogenesis rather than biogenesis is primary."

The following is a case report of two brothers which presents the classical features of Folie à deux. It also serves as an example of a concept of this entity which has evolved from study of this case and an exhaustive examination of the literature.

CASE REPORT

Identification. M. P. is a 27-year-old white, unmarried male who was admitted to Lyons V.A.H. on 9/14/56 because of ideas of refer-

ence, delusions of persecution, auditory hallucinations and bizarre, agitated behavior.

G. P., his younger brother, is a 23-year-old white, unmarried male who was admitted to Lyons V.A.H. 12 days later on 9/26/56, because of ideas of reference, delusions of persecution, auditory and visual hallucinations and silly, inappropriate behavior.

Family history. The patients' father is now 58, was born and is at present living in Greece. He completed eight years of school and is a baker and grocer in his own business. He is described by the patients as "an easy-going, sociable and good-natured person", although other relatives consider him to be "stern, critical, selfish, and irresponsible". The patients' mother is now 50, a native of Greece and living with the father. She completed ten years of school and is described by M. P., the older brother, as "cold, less than average intelligence, and too strict;" whereas G. P., the younger brother, considers her "a good-natured, quiet, loving person". A younger sibling, Angelo, age 13, is at present in Greece and said to be an intelligent, warm-hearted person. There is no other known mental illness in the family.

Personal history. The patients were born to Greek Orthodox parents in St. Claire, Pa. Birth and early development were uneventful with the exception of enuresis in the case of M. P. which persisted until age 13. In 1934 when the patients were five and one year of age, respectively, the family left this country to return to Greece. The older brother (M. P.) recalls this as a troublesome period due to language difficulty. They began school at the usual age. The older brother (M. P.) did very well, was usually at the head of his class, and completed the tenth grade by the age of 15. He was a very serious and studious boy who, according to his own statements, got along well with his peers, although in general he preferred the company of those younger than himself so that he might be the leader. During this period he repeatedly dreamed of being a hero or one of the Greek gods. Spare time was spend reading or helping his father so that he then complained bitterly that he had "no time to play". The younger brother (G. P.) did average work in school although he states, "I was the dumb one, my brothers were smarter". He was known as a quiet, submissive, suggestible boy who did not relate well and had few friends.

In 1946, at ages 16 and 12, respectively, they returned to this country without their parents. The older boy was charged with the care of the younger; a responsibility he took very seriously. He assumed the role of disciplinarian, provider, protector, and companion; in short, that of father. He has retained this relationship until the present. On arrival in this country the boys were separated so that the younger (G. P.) lived with a paternal uncle and his family and continued his education, while the older (M. P.) lived in a furnished room and supported himself with restaurant work. However, they saw each other frequently during this period. A year later they again lived together in an apartment. The older brother worked and supported them both while the younger brother continued in school, thus continuing a dominant-dependent relationship. This arrangement continued for four years until 1951 when the older brother (M. P.) was inducted into the U. S. Army. He received character ratings of excellent and served without difficulty in Korea until May of 1952 when he reported for sick call because of "confusion, irritability and homicidal urges". At that time he stated, "My mind becomes a blank almost every day. I am afraid of people—when I talk to them they get sensitive and I get excited and I lose my thinking power". Auditory visual and olfactory hallucinations were present, and he was deeply concerned with metaphysical concepts such as "mind, space and time". A diagnosis of Schizophrenic Reaction, Paranoid Type was made. Gradual improvement followed a course of 16 electroshock treatments and in April, 1953, he was discharged. During this time G. P. had completed the last year of high school and had begun work. It is interesting to note that at the age of 20, in the absence of his brother, G. P. was able to make his first heterosexual contact in the form of dating. He never again was able to achieve even this degree of adjustment in this sphere. A few days before his brother's discharge G. P. was inducted into the army, where he served creditably and without difficulty until his discharge in April, 1955. During this time M. P. made a fair adjustment and

continued to live alone supporting himself by means of various restaurant jobs. In September, 1954, he went to New Brunswick ostensibly to study landscaping at Rutgers University although it is known that most of his time was spent in secretive, seclusive study of correspondence "self-improvement" courses. He continued this until June of 1956 when he went to Washington, D. C., where he did considerable reading in the Library of Congress. A partial list of books read during this period includes: Etiquette by Emily Post, Biographies of Washington, Lincoln and Franklin, The Power of Positive Thinking, Greenhouses for Everyone, Physical Culture, The Human Mind, Greater Word Power, Everyone's Legal Advisor, A Lifetime Investment Program, and the Holy Bible.

Present illness. In early September, 1956, his landlady in Washington noted that the older brother was acting "strangely". He appeared frightened and refused to leave his room. The following day G. P., the younger brother, who had been living alone in New Jersey, received a telephone call from M. P. asking him to come to his aid. Relatives who had been seeing G. P. frequently stated that he had been increasingly "quiet and withdrawn" during the preceding few weeks, and although he had always spoken in a low voice, it was now a whisper and employed in response to direct questions only. He left New Jersey for Washington without notifying his family of his intentions, and arrived at his brother's rooming house the following day. Upon his arrival, M. P. told him of a Puerto Rican who had been putting poison gas under his door in an attempt to kill him. G. P. accepted this and numerous other delusions (see comparison of delusional systems) immediately, and the brothers spent the evening together barricaded in the cellar. The following morning they called the U. S. Secret Service for protection from their pursuers and then left for home in an attempt to elude them. En route they were arrested by the police because of their bizarre behavior. While in jail G. P. created considerable disturbance and damage because of his belief that prisoners in an adjoining cell were plotting to injure him. Upon their release M. P. was admitted to Lyons V.A.H. At this time the younger brother, G. P., remained quiet and impassive while concurring with M. P.'s delusional beliefs. Twelve days later, because of increasingly bizarre behavior, he was admitted to the same institution. It is interesting to note that during this brief period only the second time in his life when his brother was forcibly and definitely separated from him, G. P. was again able to attain a heterosexual relationship, although it was in the form of engaging a prostitute's services.

On admission to the hospital M. P. was tense and preoccupied with his ruminations. He readily admitted to visual, auditory and olfactory hallucinations. A highly complex and well-organized delusional system with a wealth of detailed elaboration was elicited, the central character of which is a Miss Griffin (M. P. is well versed in Greek mythology in which a Griffin represents a rapacious monster, half eagle and half lion) who is approximately 45 years of age, slim and dark haired. She is described as being a "warm, pleasant, wonderful woman". As a daughter of "a high U. S. Government official" she went to Greece with the U. S. troops in 1945. M. P. was on the dock watching the ships come in; there she saw him for the first time, and "out of all the other Greek boys" she singled him out and was attracted to him. He went aboard ship at her request, and there she forced him to marry (sic) her. However, he escaped, swam back to shore and returned home. One year later in 1946 on the boat to the U. S., he met her again (she now looked older). He now refused to marry her. She then sent persons who captured him and placed wires on his head so as to read his thoughts and force him to have sexual relations with her. He, however, was able to resist this. His brother, George, was treated in a like fashion but being "weaker" was not able to resist as well. On arrival in this country he called the police to protect him, but they too were in the "plan" and attempted to kill him. He again escaped by preventing their guns from going off. He has since had numerous encounters with Miss Griffin's agents but with his "superior powers" has invariably been able to escape unscathed. The last episode occurred in Washington, D. C., when a Puerto Rican was sent to put "gas" under his door to kill him. He called the Secret Service, but Mr. Griffin (Head of Secret Service) came on the

line and asked M. P. what he had done with Miss Griffin as he was unable to find her. Then because he was thought to have such a good sense of humor, he spoke (by phone) to Bob Hope and Bing Crosby and later to Mr. Truman. M. P. feels that he is equipped with special powers, including the ability to raise people from the dead, read minds, and by mental force protect himself from physical injury.

The younger brother, G. P., on admission was apprehensive, confused, manneristic and almost mute with inappropriate affect. He was experiencing auditory hallucinations almost constantly and offered a crude, poorly organized delusional system with the same general content as that of his brother's. He states that his difficulties began upon his arrival in Washington. After his brother had pointed out the fact, he noted that gas was being forced under the door by a Puerto Rican in an attempt to kill them. He also became aware of men who were following them about; although he never actually saw these men (the older brother did), he knew them to be there. G. P. stated, "While talking with my brother, I felt I left the earth, went to heaven, and came back again." At times he has referred to his brother as Jesus and to himself as "the second Jesus Christ". He attributes supernatural powers to his brother and states that, although he has no preternatural abilities, at times these have been delegated to him by his brother.

On admission the brothers were separated and have been kept apart, except for a few episodes when they either met by accident or were interviewed together. They were both placed on tranquilizers and on similar wards in the hospital. Within a few weeks M. P. became less excited and gradually developed into a cooperative, exacting, ingratiating person who spends most of his free time in the study of Greek mythology. He now questions the validity of his delusions and feels that his brother is "sick" and in need of medical care. On the other hand, G. P. continued to hallucinate and maintain his delusions for months after admission. He held telepathic conversations with his brother with evident glee. During the early months, the only time when overt hallucinations ceased was when he was actually in the presence of his brother. The patient has remained confused, manneristic and bizarre with inappropriate affect.

As additional data regarding the onset and dynamics of the older brother's psychosis, the following is reproduced unaltered from a diary kept by M. P. during his stay in Washington, and was written a few weeks prior to his hospitalization. We feel it to be an unusually vital description by a person in the throes of a paranoid reaction. He not only discusses his feelings but attempts to assign causality with no small degree of accuracy.

"I had been troubled with worry over ridiculously little things for more than five years. That is, since I became interested in self study or rather in human nature. My most feared and dangerous worry disappeared under the effective treatment of space gazing; as soon as I realized the fact that space is unlimited my brain seemed to clear for the awful fogs of mental nothingness. Then another fear appeared on the arena of consciousness to do its share of damage. This worry with a large number of other minor ones were ever ready to dominate the scene; thus it became automatic to live and think of very little that counted for improvement.

"My present assignment is to number them, to make a record of each and the cause; also what's the outcome.

"Now as the record is advanced for some time I will decide which ones I will try to win over and which ones I will not resist. Thus, my first mental worry is by the way of major importance. To describe its cause will reveal the effect or the outcome as I see it. As soon as another human being is approaching me the mind becomes paralyzed with the thought of (~~hom~~) sexuality. There is a black there causing the automatic thought wave. The cause may be due to the half baked idea that my thoughts are read by others by thought transference if I send the message to them. So far I have not failed to inform every person that I am afraid to have intercourse. That it can be done. I automatically visualize the organs and almost the position to be taken. This goes on with women as though it could be done by them as well as with men's organs. This thought has paralyzed the functions and it enables the brain to think of anything else. All other thoughts or ideas of major importance snik in to be considure of a brief second and to be colored by the feeling of not wanting to be F——. In other words I create the strong feeling of not wanting sexual intercourse of what I have in mind is not to be F——. The outcome is that the attitude of my face is visious, at times mad at person receiving the feeling and thought or idea.

"The reaction of the person is exactly what I most dread to see. This drops my self respect to a hundred below zero, at times a 50C. And at other times practically zero. Therefore I loose any favorable effect I want to make to such person because I am already negative and rediculous toward each person."

Composite Psychological Report
G. and M. P.

Tests administered. Revised Beta, Shipley-Hartford Vocab., Thematic Apperception Test, Figure Drawings, Sentence Completion, Blacky, Bender-Gestalt, Rorschach.

A. *Approach to the examination*

M. P. regarded the psychological examination situation as a means of demonstrating his intellectual capacity and impressing others with his fund of knowledge and his rationality. Clinically he was in good contact, did not appear significantly anxious, and verbalized his delusions of Miss Griffin seeking revenge upon him in a bland, effeminate, almost contented tone. He utilized his capacity for drawn-out, verbose and circumstantial rambling in order to avoid becoming emotionally involved in the examining situation.

G. P., on the other hand, was overtly hallucinatory throughout the four sessions required for the individual situation, reporting a) that M. P. was transmitting thoughts to him at this time; b) that M. P. was controlling the examiner's thoughts; c) M. P. was telling him that both sibs had come from G. P.'s stomach. G. P. perceived the examining situation as one in which he was bound to fail, and made some efforts at constricting his responses and suppressing even more bizarre and delusional material. G. P.'s inappropriate giggling throughout, his severe difficulty in concentrating upon either structured or unstructured material, and his excessive sleepiness during some of the examination indicate far more disturbance than is evident in his older brother.

B. *Intellectual functioning*

M. P. functions within the Bright Normal range, W-BI I.Q. 113, and although he shows much unevenness and lability within subtests, his general level of functioning is relatively even. He is potentially of superior intelligence. M. P.'s thinking is fluid, overabstract and lacking precision; when posed with two conflicting alternatives, his ambivalence expresses itself in seeking both at the same time in contrast to the obsessive neurotic's renunciation of both. There is little discrepancy between M. P.'s intellectual performance in the group situation (Beta I.Q. 103) and that obtained on individual testing which is suggestive of considerable self-sufficiency and self-critical ability. M. P. is capable of original creative thinking, though frequently of a delusional nature. In brief, he may be described as straddling both reality and dereism.

G. P., when left to his own devices as in the group testing situation, functions within the defective range (Beta I.Q. 65); however, with support and with a decrease of the disastrous effects of time pressure upon his limited power of concentration and attention, he is capable of functioning at the upper limit of the Borderline range (W-B1 I.Q. 79). Assuming full utilization of his intellectual potential, he does not appear capable of more than average range functioning. Marked inter and intra-test variability reflects his chaotic functioning, his severe confusion, and his difficulty in maintaining concentration upon the reality stimulus. G. P.'s perception of reality is vague and uncrystallized; occasionally he appears content with the vagueness of his world; at other times, he appears troubled but soon regresses to his hallucinations. It may be inferred that these occasions are primarily when he hallucinates M. P.'s voice for guidance, almost as the young infant hallucinates the presence of the mother when she is not present.

C. *Mood*

M. P. shows little conscious disturbance, primarily because of the extremeness of his withdrawal and the efficiency of his intellectualization and projective mechanisms. Much anxiety is syphoned off in active fantasy, and some is capable of immediate discharge through impulsive behavior. M. P. is, however, capable of verbalizing mild guilt about his role in G. P.'s psychosis. "My brother depended too much on me, he should assert himself more, it's partly my fault" and a somewhat stronger component of guilt concerning his brother's psychosis is expressed in one of M. P.'s Blacky stories. M. P. expresses much unconscious guilt over the brothers' mutual homosexual drives and, in part, projects this sexuality and his guilt in the form of the olfactory hallucination. Evidence highly suggestive of this mutual homosexuality is to be found in

M. P.'s response to Card VIII (bottom center), "Looks like two butterflies . . . they are flying one after the other or could be facing opposite, have a sexual connection or trying to have a sexual connection."

G. P.'s extreme guilt over the mutual homosexual drives and his extremely hostile feelings to his mother whom he perceives as having totally rejected him have left him almost completely anergic and incapable of responding to his environment.

D. *Defenses*

M. P.'s capacity for organizing and systematizing both reality and dereism has already been noted. Primarily, however, he shows great reliance upon intellectualization, isolation, withdrawal and projection. His response to Blacky V (in which the patient is asked to tell a story after the orientation of "Here Blacky is discovering sex") was "I don't agree with that and I think he's just being inspired by nature, that is, his generative organs begin to develop whether he was a female or a male dog, he wouldn't know the difference, he would just obey his instinct." This response reveals the complexity of his defensive operations and his primary emphasis upon intellectualization and projection.

On the other hand, G. P. gives little evidence of having at any time been capable of complex character defenses against anxiety. The test data depict him as a withdrawn, immature and passive individual. Regression and suppression of socially unacceptable responses appear to have been characteristic modes of defense against anxiety, and it may be inferred that he was frankly schizophrenic long before psychotic symptoms were noted.

Discussion

The preceding case report concerns two brothers who lived in an abnormally close, dominant-dependent relationship throughout much of their lives. The older and dominant brother had previously been hospitalized for schizophrenia. The younger, although never overtly psychotic, was a withdrawn, suggestible, submissive person. When, in the Fall of 1956, the dominant person called the dependent brother for help because of his persecutory delusions and hallucinations, G. P. responded promptly and in addition adopted the delusional system albeit in a more rudimentary and regressed form. Thus, we see that this case fulfills the basic criteria of Folie à deux: a) Two persons intimately associated, b) a common delusional system. A third requirement: that on separation the delusional ideas are dropped by the "recipient", is not seen in this case. However, this dropping of the delusion appears to be an extremely rare occurrence since Gralnick's article which reviewed the literature prior to 1942, plus a review of the total English literature since 1942 (a total of 140 cases), reveals only one case report in which this apparently occurred. This belief though very widespread does not appear to be substantiated by the facts. Although there is evidence, in at least some of these cases, that the delusions are definitely acquired by close association, there is no such evidence that this may necessarily be reversed through separation.

The question arises as to why two persons should maintain the same delusional system. If one were to accept the inferences in the classical concept of "Folie à deux", i.e., that in some way the delusions are "transmitted or imposed" through long association on the submissive or receptive person, we would, of necessity, be admitting that a person can literally be driven insane. In this case, although there was long and close association between the brothers, they had actually been separated for two years prior to the onset; yet the younger brother accepted the older's delusions immediately on being exposed to them. No prolonged period of "transmission or imposition" was necessary. Delusions, it is generally granted, serve a definite purpose and fulfill a definite need for the individual possessing them. For two persons to accept the same delusions, the needs and fulfillment thereof must be similar. This similarity in personality needs will be found most likely in those who, whether through blood or marital union, have had a close and long association. This is what is seen in Folie à deux. The intimate association which is a requirement for the development of a Folie à deux is not necessary so that "transmission or imposition" may take place; it is, however, necessary so that the two individuals will have similar basic morbid psychic structure

which is the soil in which delusions of identical nature may flourish.

That one's inner needs be fulfilled by a delusional system is not in itself sufficient to account for its adoption. Delusions *per se* are indicative of a severe psychic illness. That both persons are probably psychotic prior to the development of Folie à deux appears to be borne out by this case as well as by examination of other reported cases (10). G. P., the younger brother, had been known throughout his life as a seclusive, withdrawn person who required supervision. For the weeks prior to his meeting with his brother in Washington he was noted to be increasingly "quiet and withdrawn" and his voice had become a "whisper". Almost immediately on meeting his brother G. P. adopted the older brother's beliefs and has continued in this manner to the present.

On this evidence it is difficult to arrive at any conclusion other than that G. P. was a latent schizophrenic and had been for some time prior to his Washington trip. The same may be seen in other reported cases.

In Folie à deux we have then two persons of long and intimate association both of whom are psychotic. The dominant and, we might add, usually more intelligent and imaginative person develops a delusional system. Since they have similar psychic pathology and background as well as needs, the submissive and usually less intelligent and imaginative person is presented with a "tailor-made" system. Because the delusions were constructed to fulfill a morbid psychic structure very similar to his own, they, of necessity, fulfill his and are consequently eagerly adopted. This system of delusions is of vital value to the dependent individual in his failing effort to maintain psychic homeostatis. As Gralnick (8) points out, his only real intrapersonal contact is being lost to him via psychosis, and he must either face reality (which is impossible for him) or adopt the delusions (which are necessary to him).

The fact that the "suggestible" person does not lose the delusions when separated (as, with the older concept of induced psychosis, would be the theoretical outcome) is further proof of the basic need of the person for his "borrowed" delusions. As with other delusional patients, the delusions will be relinquished only when the pathology has been so altered that they are no longer of value.

Thus, Folie à deux is essentially a syndrome which includes and gives a name to an uncommon phenomenon which exists between two persons who are, or have been, intimately associated and now share the same delusional system.

It is not a distinctive psychopathological entity of itself but should be considered more as a fortuitous phenomenon. There are no prognostic implications which can be drawn from the diagnosis itself. And, lastly, the delusions which are maintained jointly in a Folie à deux are not forcibly "imposed" on the dependent person by the dominant person, nor are they contagious, and as such, "communicated" or "transmitted". Instead these delusions are adopted by the dependent person to meet those preexisting needs which the members of a Folie à deux possess in common.

BIBLIOGRAPHY

1. Adler, A., and Magruder, W. A.: Folie à deux in identical twins treated with electroshock therapy. *J. Nerv. & Ment. Dis., 103:* 181, 1946.
2. Ascher, E.: Folie à deux (Psychosis of association). *Arch. Neurol. & Psychiat., 61:* 177, 1949.
3. Bauer, F. C.: Folie à trois—A case report. *Psychiatric Quart., 27:* 624, 1953.
4. Bleuler, E.: *Textbook of Psychiatry.* New York: MacMillan, 534: 1924.
5. Craike, W. H., and Stater, E.: Folie à deux in uniovular twins reared apart. *Brain, 68:* 213, 1945.
6. Deusch, H.: Folie à deux. *Psychoanalyt. Quart., 7:* 307, 1938.
7. Freyhan, F. A.: Folie à deux—A clinical contribution. *Delaware M. J., 24:* 191, 1952.
8. Gralnick, A.: Carrington family; Psychiatric and social study illustrating psychosis of association or folie à deux. *Psychiatric Quart., 17:* 294, 1943.
9. Gralnick, A.: Folie à deux—The psychosis of association. *Psychiatric Quart., 16:* 230; 491, 1942.
10. Greenberg, H. P.: Crime and folie à deux. *J. Ment. Sc., 102:* 772, 1956.
11. Kallman, F. J., and Mickey, J. S.: Concept of induced insanity in family units. *J. Nerv. & Ment. Dis., 104:* 303, 1946.
12. Kallman, F. J., and Mickey, J. S.: Genetic concepts and folie à deux. *J. Hered., 37:* 298, 1946.
13. Kepner, R. D.: Folie à trois. *Dis. Nerv. System, 4:* 138, 1943.
14. Kesselman, S. R.: Folie à trois; Psychosis of association. *Psychiatric Quart., 18:* 138, 1944.
15. Kibsey, A. T.: Folie à deux; A case of familial psychosis. *Psychiatric Quart., 22:* 718, 1948.
16. Kramer, H. C.: Comparative study of nonblood related and blood related cases of folie à deux. *Individ. Psychiat. Bull., 8:* 131, 1950.
17. Kramer, H. C.: Individual psychological approach to a case of folie imposée. *Individ. Psychiat. Bull., 6:* 117, 1947.

18. Laseque, C., and Falret, J.: Folie à deux ou folie communique. *Am. Med. Psychol., 18:* 321, 1877.
19. Mensh, I. N.: Personality structure in folie à deux. *Am. J. Orthopsychiat., 20:* 806, 1950.
20. Noyes, A. P.: *Modern Clinical Psychiatry,* 3rd Ed. Philadelphia: Saunders, 1949, pp. 405.
21. Oatman, J. G.: Folie à deux—Report of a case in identical twins. *Am. J. Psychiat., 98:* 842, 1943.
22. Partridge, M.: Effect of prefrontal leukotomy on case of folie à deux et demie. *Arch. Neur. & Psychiat., 64:* 792, 1950.
23. Prins, S. A.: Case of conjugal psychosis. *Psychiatric Quart., 24:* 324, 1950.
24. Schmidt, H. O.: Case of folie à deux. *J. Abnorm. & Social Psychol., 44:* 402, 1949.
25. Wedge, B., Pittenger, R., and Whitman, R.: Spontaneous neurotic clique formation in university students. *Psychiatric Quart., 25:* 191, 1951.
26. Wellisch, E.: Rorschach study of folie à deux of mother and son. *J. Ment. Sc., 95:* 467, 1949.
27. Zabarenko, R., and Johnson, J. A.: Psychosis of association; Folie à deux. *Psychiatric Quart., 24:* 338, 1950.

HIGH FREQUENCY WAVES IN THE SPASTIC MENTAL DEFECTIVE

Preliminary Report

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This is a preliminary report on the use of high frequency waves in the brain injured child, with particular reference to the spasticity. This work is being carried on at Willowbrook State School.

For some time, we have been using Reiter's Sedac machine together with his electrostimulator, the RC 47 D to introduce the patient to electroconvulsive therapy. The use of the Sedac current prior to the institution of the grand mal has been very beneficial. The patients refer to it as sleep treatment. While under this treatment, the switch is turned, and the grand mal is produced. Then, when the convulsion is over the breathing restored, the current is turned back to the Sedac, and the patient has no recollection whatsoever of the grand mal. So far as he knows, he has been asleep. Based on a remark made by a 32-year-old female who is retarded and disturbed, whom we were treating in this way, while only the Sedac current was on, that "If I could always feel the way I feel now, there would never be any trouble," we tried the Sedac current on mental defective patients suffering from various forms of spasticity.

The Sedac is an attachment to the Reiter machine, which in itself produces a modified alternating current. The Sedac filters out all waves slower than a million per second. It is a soothing current. At the present time, we have no explanation of the mechanism involved in the production of the improvement obtained in the spastic patients. This requires further investigation. We are occupied with the clinical results.

Patients were selected who had severe spastic conditions of the extremities and trunks. In almost all cases, the fingers were in extreme flexion with the thumb locked between the third and fourth fingers, the hand flexed at the wrist, and either one or both arms flexed at the elbows against the body. In many cases, the legs were held in a scissor-like contraction. It was impossible to stretch these legs apart or to obtain any motion whatsoever.

So far, we have treated 15 patients, seven males and eight females, with an age range of 3 to 37 years. The diagnostic categories are: ten with congenital cerebral spastic infantile paraplegia; three with mental deficiency due to trauma during birth; one with other organic nervous disease; and one with cerebral palsy due to erythroblastosis fetalis. Their intelligence ratings were chiefly idiots and imbeciles with an I.Q. range of 9 to 65. Eleven had spastic quadriplegia, and four had spastic quadriplegia with marked athetosis. To date (March 13, 1957) 80 treatments have been administered ranging from 2 to 15 treatments per patient. Progressive improvement is noted as the treatments continue.

Technique

The Reiter electrostimulator (model RC 47 D) is turned on and, when warmed up, is connected to the Sedac machine. The electrodes from the Sedac are applied bitemporally. The switch is placed at position marked "L" (low), and the dial increased until the patient begins to show signs of twitching around the eyelids and about the lower jaw. The current is maintained at this position until the patient adjusts to it, and gradually is increased to tolerance. When the patient shows tolerance for the current with the dial at 3 o'clock, the dial is turned back to the "off" position. The switch is turned to "M" (medium) and the same procedure followed until finally the current is turned to the position marked "H" (high). This is done so that the patient can adjust to the increased current without suffering any discomfort. The current is left on at maximum tolerance for about 30 minutes. The patient begins to make active movements of his ex-

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tremities, at first with the upper and later on with the lower. However, these movements are active movements. When this happens, the change of expression on the patient is marked. The release from the spasticity is accompanied by a display of gratifying emotion on the part of the patient. In some cases where the spasticity is very marked and there is contracture of the tendons due to disuse, we have applied the electrodes locally. In some instances, one electrode was left at the temporal area and the active electrode was applied locally to the extremity. We have found many of these joints, in spite of the fact that they had not been moved in years, not to be ankylosed.

Case 1: A 37-year-old patient with spastic quadriplegia. The right forearm was held in severe flexion against the arm, and the arm held closely to the side with a maximum degree of flexion at the wrist, and the fingers flexed tightly around the thumb which protruded between the third and fourth fingers. The legs were held in a scissors-like spasticity. Diagnosis: Congenital cerebral spastic infantile paraplegia; I.Q. 43. At the very first treatment, he opened his hand. To date, he has received seven treatments. He moves his left leg in an attempt to unlock the scissor-crossing of the legs. The tendons are so contracted that they do not permit this action. However, he continues to go through these motions on an active basis.

Case 2: A male 21-years-of-age. Diagnosis: Mental deficiency due to trauma during birth; I.Q. 14. He has spastic quadriplegia. The arms were folded on the chest and the fingers locked. The legs were in a scissors-like position. At the very first treatment, he extended his arms and elbows and the fingers opened. He has continued these motions since. He has had six treatments. He uncrosses his legs actively and can flex them up to the abdomen.

Case 3: A 17-year-old female. Diagnosis: Congenital cerebral spastic infantile paraplegia with spastic quadriplegia; I.Q. 59. So far, after six treatments, she opens the right hand and extends the right arm. She is able to move the legs actively. She shouted with glee and happiness at the ability to initiate these motions.

Case 4: A 13-year-old female. Diagnosis: Congenital cerebral spastic infantile paraplegia with spastic quadriplegia; I.Q. 9. After four treatments, she is able to stretch her arms and to lift the legs, but she is still unable to uncross the scissors-like position.

Case 5: A 23-year-old female. Diagnosis: Congenital cerebral spastic infantile paraplegia with spastic quadriplegia, and in addition, has marked athetosis of the limbs, face, body and speech; I.Q. 33. After four treatments, the athetoid movements have diminished. She can now initiate active motion.

Case 6: A 24-year-old male. Diagnosis: Congenital cerebral spastic infantile paraplegia, with spastic quadriplegia and marked athetosis; I.Q. 65. After five treatments, he is able to flex his right elbow. He is much more composed. The athetoid movements have diminished considerably, his speech is less jerky, and he appreciates the change which has taken place within him.

Case 7: A 21-year-old female. Diagnosis: Congenital cerebral spastic infantile paraplegia, with spastic quadriplegia; I.Q. 35. The right upper extremity was held in contraction, adducted to the body with flexion at the elbow and wrist. The fingers were locked around the thumb. After four treatments, she extends the wrist and opens the fingers. She also moves her legs when asked to do so.

Case 8: A 30-year-old female. Diagnosis: Congenital cerebral spastic infantile paraplegia, with spastic quadriplegia; I.Q. 9. The upper extremities were held in spastic flexion at the elbows, wrists and fingers. The left leg was in extension and in the position of adduction crossing the right leg. The right leg was held extended from the hip. After five treatments, she extends her fingers, wrists and elbows and flexes both legs with some limitation. She also accomplishes some abduction of the left leg.

Case 9: A 14-year-old male. Diagnosis: Congenital cerebral spastic infantile paraplegia, with spastic quadriplegia; I.Q. 14. The arms are held flexed rigidly to the body, the fingers locked over the thumb, and legs in a scissors-like contraction. After three treatments, there is evidence of active motion.

Case 10: A 25-year-old male. Diagnosis: Mental deficiency due to other organic diseases, with spasticity and marked athetosis; I.Q. 56. The right arm was held in abduction at about 45 degrees. The wrist was in extreme flexion. The proximal phalanges were in extreme extension, and the middle and distal phalanges were held in extreme flexion. He had only very slight movement in the left upper extremity. The lower extremities were flexed at the knees and in scissors-like position. After three treatments, there is a visible attempt to open the fingers of the left hand. With local treatment applied to the arm, forearm and palm of the hand, the spastic rigidity disappears, and the fingers can be passively extended and flexed, but not to full extent.

Case 11: An 8-year-old male. Diagnosis: Cerebral Palsy due to erythroblastosis fetalis, with spastic quadriplegia and marked athetosis; I.Q 15. He is bedridden, his only motions were the athetoid movements of his extremities. After four treatments, he is sitting up and propels himself around the bed. He attempts to stand by grasping the side rails. He now sits in a teeter babe which he had not been able to do previously. He giggles all day long since the treatment, and he tries to formulate words.

Case 12: A 10-year-old male. Diagnosis: Mental deficiency due to trauma during birth; spastic quadriplegia; I.Q. 21. This boy had slight movements in his arms and legs, but the legs were held in a scissors-like position. He was unable to uncross them. Now, after four treatments, he uncrosses his legs in the supine position only.

Case 13: A 7-year-old female. Diagnosis: Congenital cerebral spastic infantile paraplegia, spastic quadriplegia; I.Q. 24. The arms were held extended from the shoulders at 90 degrees, the elbows flexed at 90 degrees, and the fingers were locked over the thumb in extreme flexion. Both lower extremities were held in extreme abduction almost 90 degrees from the body. The legs were flexed in a 90 degree position. The spasticity of the back was so marked that when the legs were lifted, the whole torso came up. There was extreme rigidity. After two treatments, there is slight active flexion at the knees.

Case 14: An 8-year-old female. Diagnosis: Congenital cerebral spastic infantile paraplegia; spastic quadriplegia; I.Q. 40. Her legs were held in a scissors-like position. She had very slight movements, only at the shoulder joints. The elbows and the wrists were held in extreme flexion with clenched fingers. After two treatments and even after the first treatment, she extends her forearms.

Case 15: A 3-year-old blind female. Diagnosis: Mental deficiency due to trauma during birth, whose extremities were held in rigidity; I.Q. 19. The arms were held extended at 90 degrees and forearms flexed at 90 degrees. The wrists were in extreme flexion, and the fingers locked around the thumb. The legs were in the same position as the arms, 90 degrees at the hips and the legs flexed at 90 degrees. She had a board-like rigidity of the back. This child was started on treatment during an attack of status epilepticus which could not be controlled by medication. Since that date, there have been no convulsions. This girl had 49 electrocerebral stimulation treatments. She had the Sedac current in conjunction with electrocerebral stimulation. However, since February 22, 1957, she has had only the Sedac current, 15 in number. Now she moves all her extremities actively. The back is relaxed to the extent that she can be placed in a sitting position. She moves her head and responds to auditory stimuli. When objects are placed in her hand, she retains them. It is noted in this case particularly that the Babinski which was present in both legs has disappeared from the left leg.

Discussion

We have applied the Sedac current to 15 cases of mental defectives suffering from the common symptom of spasticity, in most cases, spastic quadriplegia. The Sedac has been applied to the head. The resultant movements which have been produced in our patients are active. The patient initiates these movements under his own power and volition. In all of these cases, there has been central nervous system damage as shown by the spasticity, increased deep reflexes and absence of the superficial reflexes. The only atrophy was that of disuse. Babinski and Clonus are present. In his book ("Diseases of the Nervous System of Infants, Children and Adolescents", p. 128) Ford discusses the regaining of motility after brain damage and states that after the initial inprovement there is a second stage during which the improvement becomes more gradual. He discusses Hughlings Jackson's theory of compensation, where some other area in the brain will take up the function of the damaged area. We have demonstrated that this is possible after many years have gone by. It would be interesting to try this current in all cases of so-called "cerebral palsy" and hemiplegia.

Those patients who sit in their chairs or lay in their beds all day long in a spastic condition out of contact with the environment now, through some mechanism being released, show a change in personality and disposition. Now, they appreciate their environment, make the new movements, which they have acquired, to gain attention and to seek approval. They are in a better position now to give evidence of the functioning of their intellectual capacity which was concealed previously under the masking of the spasticity. We feel that the patient's behavior should be interpreted as indicating a real change in the use of whatever intellectual potentials existed prior to treatment and, hence, as a change in functioning intelligence level. At present, we have no way of evaluating whether there has been a change in basic capacity to deal with problems. They show an increased interest in their environment, and they await the therapist with anticipation.

Summary

1. Fifteen patients with the common symptom of spasticity were treated with the Sedac current.

2. These patients regained active motion.

PSYCHODYNAMIC AND THERAPEUTIC ASPECTS OF MESCALINE AND LYSERGIC ACID DIETHYLAMIDE

ROUND TABLE*

Held at the annual meeting of the American Psychiatric Association
May 3, 1956
Chicago, Illinois

Chairman: HERMAN C. B. DENBER, M.D.

EDITED BY HERMAN C. B. DENBER, M.D.,[1] AND MAX RINKEL, M.D., F.A.P.A.[2]

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PREFACE

The difficulty in producing major psychotic disorders in a controlled laboratory setting has long hindered the understanding and development of a rational therapy in psychiatry. Renewal of interest in mescaline and similar drugs, as well as the synthesis of lysergic acid diethylamide, has provided impetus for expansion in the field of experimental psychiatry. Most agree that mescaline and LSD produce a condition corresponding in all respects to the endogenous psychoses, although there is some debate concerning the exact similarity or dissimilarity of these states with naturally occurring psychoses. Information derived from intensive interdisciplinary study of the experimentally induced conditions will undoubtedly yield much important data concerning the naturally occurring disorders. While considerable human and animal neurophysiological and biochemical investigations have been done with both drugs, relatively little is known of their therapeutic possibilities. The use of such agents to study the psychodynamics of human behavior in a scientific frame of reference is equally unexplored.

The attempt to see man's psyche from a purely philosophical aspect has tended only to support the body-mind dichotomy. It is just as difficult to consider man without a biological frame of reference as it would be to ignore the world within which he lives. Human behavior results from continuous interaction of these two forces. The induction of disordered behavioral states offers an excellent means of studying the patient's psychological structure, as well as to correlate the concomitant organic changes with various psychopathological manifestations. The origin, meaning, and method of dealing with symptoms become observable and reportable phenomena. The construction of hypotheses from data thus derived assumes

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greater importance since they can be studied by others in a similar frame of reference.

Various studies have suggested that mescaline and lysergic acid diethylamide have therapeutic possibilities, both in the neuroses and psychoses, although this point of view is disputed by some. Additional work is needed to carefully define the parameters within which this therapeutic activity takes place.

It was with the hope of stimulating further thinking and research in this fascinating field that a Round Table was organized at the 1956 Annual Meeting of the American Psychiatric Association in Chicago. All of the participants had done considerable work, either in the laboratory, on the wards, or in private practice.

As more and more knowledge is accumulated from chemistry, anatomy, physiology, genetics, psychodynamics and sociology, it will be possible to develop an integrated and scientific theory of human behavior. Experimental psychiatry offers the tools to further explore some of these intricate problems.

THE EDITORS

NEW YORK AND BOSTON

PHARMACODYNAMICS OF LSD AND MESCALINE

MAX RINKEL, M.D., F.A.P.A.

LSD ("Delysid") and mescaline are alkaloids which occur in plants but have now been synthesized, and are used for experimental and therapeutic purposes. LSD is derived from the ergot fungus which grows on rye; mescaline is present in the cactus peyotle. Chemically, LSD is the diethylamide of d-lysergic acid, and mescaline is a trimethoxy-phenyl-ethanol-amine. LSD (50 micrograms) and mescaline (500,000 micrograms) have in common that they produce mental alterations of a psychotic-like nature and, therefore, have been used as tools in experimental psychiatry. The mescaline effects have been described by many authors. Aldous Huxley gave a most impressive account on the basis of self-experiments (1). The mental effects of LSD were discovered by Hofmann. They were confirmed and systematically explored by Stoll (2) who, in 1947, published a comprehensive report on "lysergic acid diethylamide, a phantasticum of the ergot alkaloids." Since then, a number of papers have been published confirming the original observations of both Hofmann and Stoll.

LSD was first studied in this country at the Boston Psychopathic Hospital in 1949. A preliminary report of our experiments was presented at the annual meeting of the American Psychiatric Association in 1950 (3) The psychotic phenomena caused by LSD are similar to those of mescaline. They are characterized by a schizophrenic-like turmoil state of short duration, associated with delusions, hallucinations, illusions, changes in mood, feelings of depersonalization, and catatonic signs. The neurophysiological and biochemical actions of these chemicals were correlated with their mental effects. This led to a chemical concept of psychosis and various chemophysiologic theories about the nature and origin of mental illness. This study is confined to reporting some pertinent pharmacodynamic observations and theories which tend to explain the "psychosomimetic" action of these drugs.

Much information about these drugs has been obtained from studies with radioactive mescaline and LSD. Mescaline, made radioactive by introducing a C^{14} isotope into the side chain of the molecule, was injected into mice. Block *et al.* (4–5), of the Max-Planck Institute, Marburg, Germany, determined the distribution of the radioactive mescaline in the organism. They reported that it is diffused in all tissues; the brain showed the lowest concentration, while the greatest accumulation was found, e.g., in the liver and kidneys. Mescaline had disappeared from the brain after 30 minutes, which in man is the time that the first mental phenomena occur. Further chemical research by these authors provided evidence that mescaline was transformed, within the liver, into a new protein bound chemical. The authors believe this new chemical compound to be the agent causing the mental phenomena commonly ascribed to mescaline. Patzig and Block (6) then speculated that a

similar process may be operative in the origination of an otherwise gene-bound psychosis.

Experiments to study the distribution and metabolism of LSD were undertaken with a compound which had been made radioactive by introducing a C^{14} isotope into the side chain of the LSD molecule. Stoll *et al.* (7) used mice in these experiments, and Hodge *et al.* injected the radioactive LSD into rats. Both research groups worked independently and reported similar observations (7–8). The smallest concentrations of radioactive LSD were found in the brain, and the largest accumulations in the liver, intestines, and kidneys. The resemblance of this distribution to that of mescaline is striking.

The action of LSD and mescaline upon the nervous system has been reported in many publications. At the Boston Psychopathic Hospital, we studied the effects of LSD in human beings, observing that the very first symptoms which follow its administration involved the Autonomic Nervous System. Clinical and pharmacological examinations of the Autonomic Nervous System yielded the following observations: Increased dilatation of the pupils, rise in blood pressure, acceleration but greater stability of heart beat, increased respiration and other sympathetic phenomena. From these and similar observations (9–16), it was theorized that LSD may interfere with the normal metabolism of the adrenal cycle leading to the production of a noxious adrenaline metabolite which, in turn, may cause the mental phenomena. This concept was then enlarged to include psychosis in general. It was speculated that in the origination of psychosis a similar process may take place, i.e., an endogenous, possibly gene-bound disturbance within the adrenaline cycle resulting in the occurrence of a noxious, psychotogenic, metabolite of adrenaline. Osmond and Smythies (17) in England arrived at a similar concept for the action of mescaline on the basis of the molecular similarity between mescaline and adrenaline. They postu lated the presence of a substance "M" in psychotic patients as the cause of psychosis. In the search for the substance "M", they came upon adrenochrome and, with Hoffer in Canada, described mental disturbances following the administration of adrenochrome to a few volunteers (18). Experiments in this country with adrenochrome, prepared by the Research Laboratory of Eli Lilly, were done independently at the Boston Psychopathic Hospital, at the Psychiatric Institute in New York, under Paul Hoch (19), and at Emory University School of Medicine, Atlanta, Georgia, by Carl Pfeiffer (20). According to personal communications from these authors, the intravenous administration of the Eli Lilly adrenochrome to humans was not followed by any particular mental alterations (19–20). This was also true with our own experiments. In the light of these studies, the question is still unanswered regarding the role of the adrenaline metabolite, adrenochrome, in the origin of experimental or natural psychosis. Further research will be needed and may include the investigation of adrenoxine obtained when adrenaline is enzymatically oxidized beyond the adrenochrome level. It was first described by Heirman (21–23) in France, and seems to have similar physiological effects upon the autonomic nervous system as were described with LSD administration.

Another chemical theory of psychosis is based upon the presence of serotonin in the brain. Serotonin (5-hydroxytryptamine) was shown by Page (24) and Gaddum (25) to be normally present in the brain. This discovery led to the speculation that it may be of importance in the maintenance of normal mental function. Woolley and Shaw (26–28) found that a variety of compounds which cause hallucinations and other central effects were anti-metabolites of 5-hydroxy tryptamine, i.e., structural analogues of serotonin which function as specific and reversible antagonists of serotonin on smooth muscles. Such compounds are the ergot alkaloids (of which LSD is hallucinogenic), some of the harmala alkaloids (notably harmine, yohimbin) and its derivatives such as reserpine, and synthetic analogues of serotonin, such as medmain and 2-methyl-3-ethyl-5-nitroindole. The anti-metabolites cause a deficiency of the hormone serotonin in the classical manner of anti-metabolites by competition for the same cell receptors. On the basis of these and other pertinent observations, especially on human and rat oligodendroglial cells of the brain which were cultured *in vitro*, the authors theorized that interference with the serotonin of the brain would result in

abnormal mental phenomena. Either raising or lowering of the functioning concentration seems to cause profound disturbance. Woolley (28) recently presented "evidence for the participation of serotonin in mental processes." The serotonin theory of Woolley and Shaw (26) was challenged by Cerletti and Rothlin (29) on the basis of the observation that 2-brom-d-lysergic acid diethylamide (BOL 148) *in vitro* is as powerful an antagonist of serotonin as LSD and, at the same time, does not cause mental changes in humans. The latter, therefore, expressed the opinion that one is "not justified in assuming a causal relationship between the psychic effects of lysergic acid diethylamide and its anti-5-hydroxytryptamine property" at the present time.

A chemophysiological theory for the action of LSD and mescaline was proposed by Marrazzi (30–31). He investigated the effects of mescaline, LSD, adrenaline, nor-adrenaline, serotonin and others upon transcallosal monosynaptic transmission, and demonstrated that these substances caused inhibition of synaptic transmission. He theorized that "synaptic inhibition could readily result in release from normal restraining influences with consequent stimulation," and speculated that hallucinations may represent a stimulatory phenomena. From the study of the effects of adrenaline and structurally related compounds, he further concluded that a disturbance of adrenergic or related cerebral neurohumoral mechanisms appears to be implicated in the action of mescaline and LSD.

In summarizing the various observations, theories, speculations and opinions on the action of LSD and mescaline, the fact seems to emerge that neither drug acts directly but by the mediation of or interference with other chemicals (adrenaline metabolites, 5-hydroxytryptamine), or by causing inhibition of synaptic transmission in the brain.

As can be seen, the psychosomimetic drugs, LSD and mescaline, were originally used as tools for research in experimental psychiatry. Their use for therapeutic purposes was only recently investigated, independently, at about the same time in Germany, England, and in this country. Frederking (32–33) in Germany reported that LSD as well as mescaline could be used successfully in psychotherapy. Similar reports on LSD were published by Sandison *et al.* (34) in England. In this country, Denber and Merlis (35–39) concentrated especially on the therapeutic use of mescaline, and Abramson (40) on that of LSD.

BIBLIOGRAPHY

1. Huxley, A.: *The Doors of Perception*. New York: Harper & Brothers, 1954.
2. Stoll, W. A.: Lysergsäure-diäthylamid, ein Phantastikum aus der Mutterkorngruppe. *Schweiz. Arch. Neurol. u. Psychiat., 60:* 279, 1947.
3. Rinkel, M.: Discussion. Annual Meeting, APA, Detroit, May, 1950. *J. Clin. Psychopath., 12:* 42, 1951.
4. Block, W.: In-vitro-Versuche zum Einbau von 14C-Meskalin und 14C-Beta-Phenylathylamin in Proteine. *Hoppe-Seyler's Ztschr. physiol. Chem., 294:* 1–12, 1953; *294:* 49–56, 1954; *296:* 1–10, 1954; *296:* 108–121, 1954.
5. Block, W., Block, K., and Patzig, B.: Zur Physiologie des 14C-radioaktiven Meskalins im Tierversuch. *Hoppe-Seyler's Ztschr. physiol. Chem., 290:* 160–168, 1952; *290:* 230–236, 1952; *291:* 119–128, 1952.
6. Patzig, B., and Block, W.: Zur Auffassung des schizophrenen Prozessgeschehens nach Tierversuchen mit 14C-radioaktiven Meskalin. *Die Naturwissenschaften, 1:* 13–17, 1953.
7. Stoll, A., Rothlin, E., Rutschmann, J., and Schalch, W. R.: Distribution and fate of 14C-labeled lysergic acid diethylamide (LSD-25) in the animal body. *Experientia, 11:* 396, 1955.
8. Boyd, E. S., Rothlin, E., Bonner, J. F., Slater, I. H., and Hodge, H. C.: Preliminary studies on the metabolism of lysergic acid diethylamide. *J. Pharmacol. & Exper. Therap., 113:* 6, 1955.
9. Rinkel, M., DeShon, H. J., Hyde, R. W., and Solomon, H. C.: Experimental schizophrenia-like symptoms. *Am. J. Psychiat., 108:* 572–578, 1952.
10. DeShon, H. J., Rinkel, M., and Solomon, H. C.: Mental changes experimentally produced by LSD. *Psychiatric. Quart., 28:* 33–53, 1952.
11. Rinkel, M., Hyde, R. W., Solomon, H. C., and Hoagland, H.: Experimental psychiatry. II. Clinical and physio-chemical observations in experimental psychosis. *Am. J. Psychiat., 111:* 881–895, 1955.
12. Rinkel, M., Hyde, R. W., and Solomon, H. C.: Experimental psychiatry. III. A chemical concept of psychosis. *Dis. Nerv. System, 15:* 3–8, 1954.
13. Rinkel, M., Hyde, R. W., and Solomon, H. C.: Experimental psychiatry. IV. Hallucinogens: tools in experimental psychiatry. *Dis. Nerv. System, 16:* 1–4, 1955.
14. Hoagland, H., Rinkel, M., and Hyde, R. W.: Adrenocortical function and urinary phosphate excretion. *Arch. Neurol. & Psychiat., 73:* 100–109, 1955.
15. Rinkel, M.: *Biochemical Reflections on the Psychosis Problem in Lysergic Acid Diethylamide and Mescaline in Experimental Psychiatry*. New York: Grune & Stratton, Inc., 1956.
16. Rinkel, M.: Experimentally induced psychoses in man. In *Neuropharmacology*. Transactions of the Second Conference, May 25, 26 and 27, 1955,

Princeton, N. J. New York: Josiah Macy, Jr. Foundation, 1956.
17. Osmond, H., and Smythies, J.: Schizophrenia: A new approach, I. *J. Ment. Sc., 98:* 309–315, 1952.
18. Hoffer, A., Osmond, H., and Smythies, J.: Schizophrenia: A new approach, II. Result of a year's research. *J. Ment. Sc., 100:* 29–45, 1954.
19. Personal communication.
20. Personal communication.
21. Heirman, P.: L'adrénoxine, adrénaline oxydée inhibitrice. *Comptes rendus Soc. de Biologie,* Paris, *126:* 1264, 1937.
22. Heirman, P.: Quelques propriétés physiques de l'adrénoxine. *Comptes rendus Soc. de Biologie,* Paris, *127:* 345, 1938.
23. Heirman, P., and Goffart, M.: Action mydriatique de l'adrénoxine. *Comptes rendus Soc. de Biologie,* Paris, *132:* 84, 1939.
24. Page, I. H.: Serotonin (5-hydroxytryptamine). *Physiol. Rev., 34:* 563–588, 1954.
25. Gaddum, J. H.: Antagonism between lysergic acid diethylamide and 5-hydroxytryptamine. *J. Physiol., 121:* 15P, 1953.
26. Woolley, D. W., and Shaw, E.: Some neurophysiological aspects of serotonin. *Brit. M. J., 2:* 122, 1954.
27. Woolley, D. W., and Shaw, E.: A biochemical and pharmacological suggestion about certain mental disorders. *Proc. Nat. Acad. Sc., USA, 40:* 228, 1954.
28. Woolley, D. W., and Shaw, E. N.: Evidence for the participation of serotonin in mental processes. *Science, 124:* 34, 1956.
29. Cerletti, A., and Rothlin, E.: Role of 5-hydroxytryptamine in mental diseases and its antagonism to lysergic acid derivatives. *Nature, 176:* 785, 1955.
30. Marrazzi, A. S.: Nerve impulse transmission and related problems. Proceedings, Council for High Blood Pressure Research, American Heart Association, 1954, pp. 6–37.
31. Marrazzi, A. S.: Ganglionic and central transmission. *Pharmacol. Rev., 6:* 105–106, 1954.
32. Frederking, W.: Ueber die Verwendung von Rauschdrogen (Meskalin und Lysergsäure-diaethylamid) in der Psychotherapie. *Psyche, 6:* 342, 1953/54.
33. Frederking, W.: Intoxicant drugs (mescaline and lysergic acid diethylamide) in psychotherapy. *J. Nerv. & Ment. Dis., 121:* 262–266, 1955.
34. Sandison, R. A., Spencer, A. M., and Whitelaw, J. D. A.: The therapeutic value of lysergic acid diethylamide in mental illness. *J. Ment. Sc., 100:* 491–507, 1954.
35. Denber, H. C. B., and Merlis, S.: A note on some therapeutic implications of the mescaline-induced state. *Psychiatric. Quart., 28:* 635–640, 1954.
36. Denber, H. C. B., and Merlis, S.: Studies on mescaline. I. Action in schizophrenic patients. *Psychiatric. Quart., 29:* 421–429, 1955.
37. Denber, H. C. B.: Studies on mescaline. III. Action in epileptics. *Psychiatric. Quart., 29:* 433–438, 1955.
38. Denber, H. C. B., and Merlis, S.: Studies on mescaline. VI. Therapeutic aspects of the mescaline-chlorpromazine combination. *J. Nerv. & Ment. Dis., 122:* 463–469, 1955.
39. Denber, H. C. B.: Studies on mescaline. VII. The role of anxiety in the mescaline-induced state and its effect upon the therapeutic result. *J. Nerv. & Ment. Dis.* (In press).
40. Abramson, H. A.: Lysergic acid diethylamide (LSD-25). III. As an adjunct to psychotherapy with elimination of fear of homosexuality. *J. Psychol., 39:* 127, 1955.

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BIOLOGICAL CHANGES IN MAN FOLLOWING INTRAVENOUS ADMINISTRATION OF MESCALINE

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This report concerns a research investigation carried out under the supervision of Professor Jean Delay, in collaboration with Drs. M. Raclot, J. Thuillier, and M. Ropert. Its main purpose was to study the biological reactions to intravenous mescaline, of which little is known. Renewal of interest during the last few years in the hallucinogens, or "psychosomimetic" compounds, has been concerned particularly with the psychological aspects. Mescaline and LSD have been used experimentally to create psychopathological states comparable to some psychotic disturbances. The ability of various substances to reverse these states has confirmed, in addition, the therapeutic effectiveness of chlorpromazine. "Psychosomimetic" compounds have been used therapeutically as an aid in accelerating psychoanalytic therapy.

It was felt useful to determine if mescaline, besides its specific psychodynamic properties, could bring about any biological reactions similar to those described in connection with shock or stress reactions. This would be of importance in the interpretation of various therapeutic results.

Heffter (1), who isolated the drug in 1894, initiated biological research with mescaline.

The most interesting recent studies have been those related to the search for mescaline antagonists. Quastel and Wheatley (2) in their work on the "cerveau isole" and Schueler (3) with *in vivo* studies demonstrated the action of sodium succinate. This has been confirmed by Delay *et al.* (4). Hoch (5) reported that the combination of amytal-methedrine gave excellent results in blocking the mescaline-induced state. The amphetamines apparently act on the perceptual disturbances. Some barbiturates, such as sodium amytal or pentothal, seem to have a sedative action on the mescaline-induced state.

The neuroleptics have been among the more recent mescaline antagonists studied. Clinical studies and electroencephalographic observations by various authors (5–8) have confirmed that chlorpromazine can counteract the mescaline intoxication with its attendant autonomic disturbances. Reserpine (5) acts in the same way but more weakly. Frenquel has a similar property according to Rinaldi and Himwich (9).

We have been able to demonstrate experimentally (10) that chlorpromazine can block the action of mescaline. The rise in blood pressure brought about by the intravenous injection of mescaline in the rabbit is prevented by premedication with chlorpromazine.

Method

Thirty-seven patients were studied while hospitalized at the University Psychiatric Clinic (Clinique St. Anne) in Paris. Mescaline hydrochloride was injected intravenously (10 mg. of mescaline base per kilo of body weight) at the rate of 2 cc. per minute. The patient was fasting, lying in bed, in a quiet room. Only the physician was present. Various tests were performed routinely immediately before the injection, ten minutes afterwards, at one-half hour, one hour, two hours and four hours. The different measurements of autonomic nervous system reactivity were made at the same time and then every three hours until the twenty-fourth hour. The experimental mescaline state was either allowed to follow its normal course towards complete resolution within 24 hours, or was interrupted by the intramuscular injection of 50 mg. of chlorpromazine one or two hours after the injection of mescaline. Finally, we were able to record electroencephalograms in 10 patients while under the effects of mescaline. Polygraphic recordings were made in some cases. Twenty-five of 37 patients were systematically studied following the intravenous administration of mescaline.

Results

1. *Neurovegetative symptoms*

These are the first signs of mescaline intoxication; a fact already noted heretofore. Nausea with or without vomiting may appear immediately following the injection. In most cases it stops within the first hour. With some patients nausea continues but disappears after the administration of chlorpromazine. The patients begin to perspire almost immediately. Mydriasis develops fairly quickly, either in the course of the injection or within 10 minutes, and lasts about 24 hours. The vasomotor phenomena occur very early. An unusually intense but temporary congestion of the face appears during the injection, decreases progressively, and disappears during the first half-hour. It is replaced by a more or less intensely pale facies. A symmetrical acrocyanosis of the upper and lower extremities is noted during the first 10 minutes, and lasts from one to several hours. Finally, a generalized tremor appears by the second hour. It is often severe, partially under voluntary control. It stops spontaneously after several hours, but is abolished by the injection of chlorpromazine.

Pulse and blood pressure gave rather uniform data with the various subjects and even with one individual after repeated trials. The pulse rate increased in all patients, sometimes as soon as the injection was completed. It progressively increased most often during the first half-hour. The average increase was 28 beats per minute. The pulse rate remained stationary until the fourth or fifth hour after the injection, and then decreased to its initial level after the twenty-fourth hour. In 21 of 25 patients, mescaline increased the systolic and diastolic blood pressure from one to five centimeters of mercury. The blood pressure began to increase within 20 minutes following the injection, reached a maximum within the first hour and often remained at this level until the fourth hour. It then decreased progressively

until the twenty-fourth hour, and returned to the initial or slightly lower levels.

The temperature showed rather consistent variations. Hypothermia was generally observed during the first hours, with a fall as low as 97.2°F. There was a rapid shift at the fourth hour in the direction of moderate hyperthermia, reaching and sometimes going above 100.4°F.

The respiratory amplitude and frequency increased leading to an intense polypnea. The amplitude was always increased, at least during the first hour. The frequency increased from three to five respiratory movements per minute during the first hour, and usually returned to basal levels after the second hour.

As soon as the pulse accelerated, the oculocardiac reflex could no longer be elicited.

2. *Chemical determinations*

(a) The *blood sugar* (table 1) showed a rather consistent elevation during the first 10 minutes after the intravenous injection of mescaline. It reached a maximum after 30 to 60 minutes had elapsed and returned to the initial level between two and four hours. The blood sugar increased 33 mg. per cent (average of 19 patients). Since the averge initial blood sugar was 94 mg. per cent, this would correspond to a change of 35.1 per cent from the average initial value.

TABLE I.—Blood Sugar—(mg. %)

Patients	Before Mescaline Inj.	After Mescaline			
		10 min.	30 min.	1 hour	2 hours
MON	0.80	1.10	1.25	1.25	1.25
RAT	0.92	1.13	1.34	1.34	1.34
MAL	1.06	1.13	1.20	1.20	1.15
BAC	0.90	1.06	1.06	1.10	0.84
CHA	1.00	1.10	1.25	1.25	1.05
SZE	0.93	0.93	1.15	0.93	1.01
PRO	0.94	1.04	1.27	1.70	1.77
LEC	0.97	0.97	0.97	1.06	1.06
RIG	1.01	1.10	1.19	1.01	1.01
RUG	1.06	1.17	1.20	1.48	1.20
MIS	1.01	1.10	1.27	1.16	1.10
NAK	0.95	1.19	1.27	1.22	1.01
WUL	1.01	1.27	1.48	1.34	1.18
HER	1.06	1.34	1.19	1.19	1.01
ARN	0.92	1.04	1.31	1.17	1.02
HOM	0.82	1.02	1.16	1.16	0.94
FER	1.01	1.13	1.13	1.34	1.34
JEG	0.94	0.94	1.16	1.16	1.10
NED	0.84	1.06	1.17	1.17	0.99

The first three patients received 50 mg. of intramuscular chlorpromazine after the 60-minute blood sample was taken.

TABLE 2.—Blood Potassium—(meq./liter)

Patients	Before Mescaline Inj.	After mescaline			
		10 min.	30 min.	1 hour	2 hours
MON	0.195	0.181	0.162	0.162	0.150
RAT	0.180	0.168	0.163	0.150	0.158
MAL	0.204	0.204	0.192	0.192	0.170
BAC	0.168	0.156	0.144	0.150	0.160
CHA	Hemolyzed	0.130	0.120	0.120	0.140
SZE	0.192	0.180	0.192	0.198	0.192
PRO	0.180	0.168	0.150	0.146	0.156
LEC	0.192	0.184	0.184	0.171	0.177
RIG	0.210	0.190	0.180	0.190	0.194
RIG	0.204	0.189	0.186	0.180	0.186
RUG	0.186	0.180	0.168	0.168	0.174
MIS	0.204	0.196	0.174	0.170	0.189
NAK	0.196	0.186	0.180	0.189	—
WUL	0.198	0.180	0.174	0.174	0.174
RIB	0.192	0.172	0.168	0.168	0.180
HER	0.192	0.180	—	0.186	0.186
ARN	0.192	0.180	0.172	0.172	0.172
HOM	0.186	0.174	0.162	0.162	—
FER	0.198	0.180	0.178	0.174	0.180
JEG	0.192	0.192	0.186	0.180	0.162
NED	0.190	—	0.168	0.168	0.178

The first three patients received 50 mg. of intramuscular chlorpromazine after the 60-minute blood samples were drawn.

(b) *Blood potassium* (table 2). There was a consistent decrease within the first 10 minutes after the injection of mescaline. The potassium reached its lowest point between 30 and 60 minutes afterwards and had not returned to the initial levels by the second hour. The average decrease of potassium (milliequivalents) was 0.51 meq. per liter. The initial average value was 4.93 meq. per liter. This corresponded to a change of 12.3 per cent.

(c) The determination of sodium and chloride (intracellular and plasma), as well as proteins, did not disclose any appreciable variations during our experimental investigations.

(d) *Urine* (table 3). An increased urinary excretion of the total 17-ketosteroids, averaging 4.7 mg., was found in 10 of 16 patients during the 24-hour post-mescaline period. The initial average value was 11.1 mg., and the

average change was 42.3 per cent. Excretion during the 24 hours was decreased by an average of 2.7 mg. in six cases.

TABLE 3.—CHANGES IN 24-HOUR URINARY 17-KETOSTEROID EXCRETION (MG.)

Patients	Before Mescaline	After Mescaline
MON	25.8	25.0
RAT	6.1	18.4
MAL	9.0	10.6
BAC	14.5	12.7
SZE	12.0	15.0
PRO	13.0	18.4
ABA	4.2	19.2
BRA	11.5	4.2
LEC	17.8	20.2
MIS	6.8	7.0
NAK	10.3	8.8
ARN	10.0	5.2
GAU	13.4	16.0
NED	5.5	10.0
HRA	8.7	9.3
HAV	10.3	10.2

TABLE 4.—CHANGES IN LEUKOCYTE COUNT

Patients	Before Mescaline Inj.	After Mescaline				
		10 min.	30 min.	1 hour	2 hours	4 hours
MON	9,400	18,400	—	12,000	9,000	—
RAT	9,400	9,100	9,500	13,800	19,700	—
MAL	11,000	17,000	13,900	10,700	22,100	
BAC	6,700	8,900	Coagulated	12,100	—	18,700
CHA	10,300	11,800	16,400	11,900	17,500	20,200
SZE	8,700	10,900	9,900	12,900	12,700	16,600
PRO	15,600	22,700	18,000	17,600	26,400	24,200
LEC	5,800	5,400	6,100	7,000	15,200	9,100
RUG	7,400	15,000	14,900	14,800	14,800	18,100
RIB	7,800	10,000	10,800	11,500	14,800	14,800
HRA	6,300	6,900	7,100	6,300	6,800	6,500
NED	4,400	—	—	4,600	—	13,500
HER	8,000	—	—	8,400	—	15,000
JEG	7,600	—	—	8,400	—	13,600
HOM	8,700	—	—	10,000	—	12,400
GAU	5,500	—	—	6,500	—	14,900
MAL (2nd test)	11,700	—	—	12,900	—	15,700
HOM (2nd test)	8,900	—	—	8,800	—	11,400
HAV	6,900	—	—	12,800	—	19,200

The first three patients received 50 mg. of intramuscular chlorpromazine after the 60-minute blood samples were drawn.

TABLE 5.—EOSINOPHILE COUNT

Patients	Before Mescaline Inj.	After Mescaline				
		10 min.	30 min.	1 hour	2 hours	4 hours
MON	271	243	—	219	136	—
RAT	151	135	162	156	44	
MAL	156	141	117	126	36	—
BAC	109	107	—	92		18
CHA	256	253	160	155	33	7
SZE	94	62	61	45	30	5
PRO	518	532	659	557	252	18
LEC	108	106	82	45	26	7
RUG	140	206	195	203	56	15
RIB	163	180	157	132	47	3
HRA	39	31	27	31	38	35
NED	124	—	—	74	—	3
HER	112	—	—	67	—	5
JEG	60	—	—	29	—	3
HOM	167	—	—	155	—	6
GAU	252	—	—	122	—	6
MAL (2nd test)	111	—	—	31	38	35
HOM (2nd test)	125	—	—	128	—	6
HAV	174	—	—	122	—	8

The first three patients received 50 mg. of intramuscular chlorpromazine after the 60-minute blood samples were drawn.

3. *Hematologic changes* (table 4)

All patients showed a marked leukocytosis reaching its highest level between the second and fourth hours. This was followed by a slow decline to basal levels at the twenty-fourth hour. The initial average value was 8,400. The average increase was 8,000. This represented a 95 per cent change from the initial levels.

Eosinophile count (table 5). The sharp eosinophile fall (Thorn test) was most marked at the fourth hour, and still present at 24 hours. The initial average value was 164. The average fall was 155 eosinophiles. This was equivalent to a change of 94.3 per cent from the initial levels.

4. *Electroencephalographic observations*

G. Verdeaux (1950) found that with oral mescaline the alpha rhythm was blocked at the moment hallucinations occurred. This is a fairly common phenomenon and is probably due to the attention set.

Electroencephalographic observations were

made on 10 patients in this study following the intravenous injection of mescaline. The wave forms were fairly flat; probably the result of a persistent blocking effect. This could have resulted from a more intense reaction due to the intravenous mescaline. The flattened record with disappearance of alpha activity made impossible any correlation with psychosensory phenomena.

5. *Polygraphic studies*

Three patients with an excellent alpha per cent time were studied with the polygraph. This test was run with the patient at rest, listening to music, or being questioned. In spite of fairly strong reactions, there were no real changes of the psychogalvanic reflex. Cardiac and respiratory rhythms were usually normal. Comparison of variations in the psychogalvanic reflex with those of alpha activity was found not to be significant. The polygraphic studies showed the emotional reactions to be insignificant in spite of alpha blocking.

Discussion

Our data may be interpreted in various ways. It would seem that some of the autonomic symptoms are characteristic of mescaline itself. These are the early and persistent mydriasis, immediate and generalized sweating, acrocyanosis, nausea and vomiting. The latter are very rarely absent. Symptoms like polypnea and tremor are difficult to interpret. It is probable that they result from a specific action of the drug and are accentuated by the psychological state of the patient.

Finally, the constant modification of pulse, arterial blood pressure and temperature may be linked to the organic stress reactions. This concept can be substantiated by the unequivocal and significant modification of body fluids in some patients (hyperglycemia, fall in blood potassium, leukocytosis with eosinopenia). These variations were always in the same direction and usually significant. The interpretation of data on the excretion of 17-ketosteroids is difficult. The technical problems inherent in these determinations are well known, and obtaining 24-hour urine specimens in a psychiatric service is most difficult.

Conclusions

1. Some biological constants that we have studied are consistently modified in the same direction. Many of these changes were characteristic of the mescaline-induced state.

2. There was a constant increase in blood sugar, a persistent fall in blood potassium, a marked leukocytosis with an equally abrupt fall of the eosinophiles. The increase in 17-ketosteroids was inconstant.

3. These results seem to suggest a general bodily response to external stress. In this particular case, we suggest use of the term "mescaline shock". This concept would have to be considered in evaluating the various therapeutic results that have been reported.

4. In studying the mechanism of the mescaline stress reactions it is not possible at this time to differentiate the latter from the psychological stress precipitated by the intravenously injected drug.

BIBLIOGRAPHY

1. Heffter, A.: Uber Peotle. *Arch. exper. Path. u. Pharmacol., 34:* 2975, 1894.
2. Quastel, J. H., and Wheatley, A. H. M.: The effects of amines on oxidations of the brain. *Biochem. J., 27:* 1609–1613, 1933.
3. Schueler, F. W.: Effect of succinate in mescaline hallucinations. *J. Lab. & Clin. Med., 33:* 1297–1303, 1948.
4. Delay, J., Gerard, H. P., et Thuillier, J.: Toxicité aigue du sulfate de mescaline et antidotisme du succinate de sodium. *Comptes rendus Soc. de Biologie, Paris, 144:* 163, 1950.
5. Hoch, P. H.: Experimental psychiatry. *Am. J. Psychiat., 111:* 787–790, 1955.
6. Denber, H. C. B.: Chlorpromazine and Mescaline: Colloque international sur la chlorpromazine et les médicaments neuroleptiques en clinique psychiatrique. Paris, 20–22, Octobre, 1955. Encéphale (In press).
7. Denber, H. C. B., and Merlis, S.: A note on some therapeutic implications of the mescaline-induced state. *Psychiatric. Quart., 28:* 635–640, 1954.
8. Schwartz, B. E., Bickford, R. G., and Rome, H. P.: Reversibility of induced psychosis with chlorpromazine. *Proc. Staff Meet. Mayo Clin., 30:* 407–417, 1955.
9. Rinaldi, F., and Himwich, H. E.: The cerebral electroencephalographic changes induced by LSD and mescaline are corrected by Frenquel. *J. Nerv. & Ment. Dis., 122:* 929–932, 1955.
10. Delay, J., Demner, P., Ropert, M., and Thuillier, J.: Antagonisme de la mescaline et de la chlorpromazine. *Comptes rendus Soc. de Biologie, Paris* (In press).

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THE EFFECTS OF MESCALINE SULFATE IN CHRONIC SCHIZOPHRENIA

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The present study was undertaken to determine the use and effectiveness of mescaline sulfate in chronic schizophrenic patients, as part of a general program evaluating the therapeutic use of this agent in psychiatry. Hoch, Cattell and Pennes (1), Cattell (2), Hoch (3), Denber and Merlis (4) have reached various conclusions regarding this mode of treatment. Denber and Merlis (5) indicated that mescaline-chlorpromazine was clinically effective in 25 of 40 acutely ill schizophrenics. Seven of 17 chronically ill patients showed equivocal improvement (5). The present report is an extension of the latter investigation utilizing increasing amounts of mescaline. It was felt that chronic patients might possibly respond to higher doses.

Materials and Methods

Twenty-four female patients, ranging in age from 29 to 58, were studied (table 1). All were schizophrenics and distributed through four major diagnostic categories (table 2). The duration of illness varied from 16 months to 14 years (table 3). All patients were in the hospital at least one year prior to this study and were selected at random.

TABLE 1.—Age

29–39 years	7
39–49 years	12
49–58 years	5

TABLE 2.—Clinical Diagnosis

	Chronic
Dementia Praecox, paranoid	9
Dementia Praecox, catatonic	6
Dementia Praecox, hebephrenic	8
Dementia Praecox, simple	1

TABLE 3.—Duration of Illness Before Admission

Time	Chronic
1–5 years	11
6–10 years	7
11–14 years	6

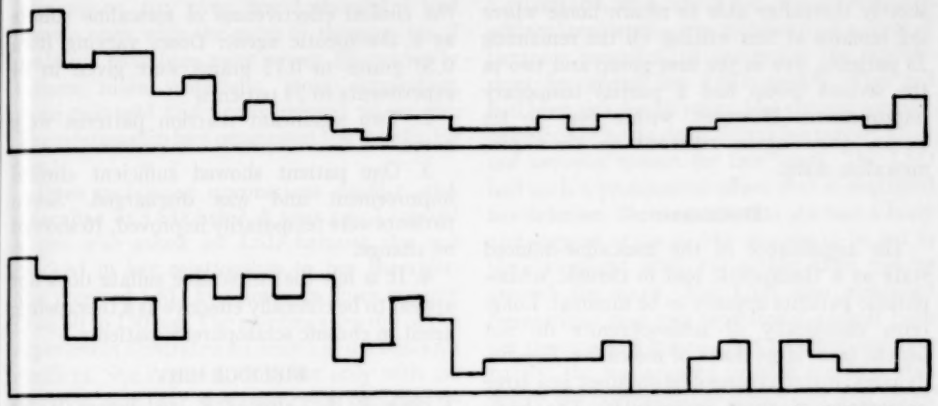
Method

All medication, including sedation, was discontinued for 24 hours prior to the study. Breakfast was withheld from the patient on the morning of the test. The study was conducted in a quiet, well lit, pleasant room. Mescaline sulfate (0.50 grams to 0.75 grams diluted in 20 cc. of saline) was injected intravenously. Pulse and blood pressure recordings were determined during the period of injection but discontinued afterwards. The patients were questioned at intervals during four to six hours after the injection. No interpretations were made of the material elicited. No leading questions were asked. The patients were observed until the effects of mescaline had disappeared and were then returned to their wards. A total of 34 experiments were done with 24 patients. Ten patients had two sessions; the first with 0.50 grams of mescaline, and the second with 0.75 grams of mescaline.

Results

The effects of mescaline sulfate, such as accelerated pulse rate, flushing of the face, variable blood pressure changes and pupillary dilatation, were essentially as reported before and not significantly different from those seen in patients with short-term schizophrenic illnesses. A symptom profile was used similar to that reported previously (5) and is noted in Chart I.

The injection of mescaline sulfate served to bring forth and reflect the patient's basic personality structure; a fact we have noted before (5). It is of interest that a higher dose did not yield any significant changes in psychodynamic material. Three-quarters of a gram of mescaline produced an aggravation and accentuation of the reaction pattern elicited at the lower level (0.50 grams), but little or no new material or significant change of behavior was seen. Furthermore, once the patient had established himself in one of the categories of



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

CHART I. (Data available in 24 patients). Profile of symptoms shown by chronic patients. There is little change in the profile between the pre-and post-mescaline periods.

Key:

1—Tension
2—Anxiety
3—Panic
4—Uneasiness
5—Restlessness
6—Mutism
7—Antagonism
8—Negativism
9—Suspicion
10—Hostility
11—Inappropriateness
12—Euphoria
13—Silliness
14—Delusions
15—Hallucinations
16—Nihilism
17—Grandeur
18—Unreality
19—Depersonalization
20—Bizarreness
21—Fatigue
22—Echolalia
23—Echopraxia
24—Stereotypy
25—Lethargy
26—Somnolence
27—Irrelevant
28—Incoherent
29—Flighty
30—Neologisms
31—Sexual material

responsiveness with 0.50 grams, a second injection of 0.75 grams did not alter the basic reactions. In general, the responses of all 24 patients could be placed in two distinct categories by describing their individual reaction patterns:

1) Seven patients experienced marked anxiety, apprehension, increased psychomotor activity and intensification of the hallucinations and delusional thinking. There was increased irrelevancy, flight of ideas, neologisms and marked out-pouring of sexual material. These patients frequently became amorous, demanding, used provocative phrases and developed a generally seductive attitude. The intensification of these reactions in one patient became so great that 22.5 grains of sodium amytal were required to sedate her. Feelings of hostility, aggressiveness and a tendency to vilification of personnel and patients were seen as well.

2) Seventeen patients developed all of the major physiological responses and became conscious of inner feelings of tension and uneasiness. But there were practically no overt emotional discharges. They frequently accepted the injection in a docile cooperative manner. After four hours, they still showed no response. Three of these patients insisted upon getting up and leaving the examining room to return to their wards after the injection. They seemed to be frightened of the experimental situation. They did not show evidence of hostile, aggressive or sexual activity at any time. There was a marked paucity of material elicited from these patients.

It has been our experience that the responsiveness in verbalization of dynamically significant material seemed much more prominent in female than in male schizophrenic patients.

Following the mescaline-induced experience, only one of the entire group of 24 patients exhibited any significant change in her clinical picture. Her reaction pattern was in the first group. She appeared more controlled, somewhat more integrated in her thinking, and was

shortly thereafter able to return home where she remains at this writing. Of the remaining 23 patients, five in the first group and two in the second group had a partial temporary improvement. However, within four to six weeks, they again returned to their pre-mescaline state.

Discussion

The significance of the mescaline-induced state as a therapeutic tool in chronic schizophrenic patients appears to be minimal. Long-term chronically ill schizophrenics do not benefit from large doses of mescaline. Psychodynamic material cannot be obtained in a large percentage of these individuals. The basic personality structure comes to the surface under the influence of mescaline but apparently cannot be handled in a therapeutic fashion for the eventual clinical improvement of the patient. It appears that in chronic schizophrenia, at least, the induction of anxiety by intravenous mescaline is not in itself sufficient to produce any results leading toward a significant relief of symptoms.

Conclusion

1. Twenty-four chronic schizophrenic patients were studied in an effort to determine the clinical effectiveness of mescaline sulfate as a therapeutic agent. Doses varying from 0.50 grams to 0.75 grams were given in 34 experiments to 24 patients.

2. Two significant reaction patterns were noted.

3. One patient showed sufficient clinical improvement and was discharged. Seven patients were temporarily improved, 16 showed no change.

4. It is felt that mescaline sulfate does not appear to be clinically effective as a therapeutic agent in chronic schizophrenic patients.

Bibliography

1. Hoch, P. H., Cattell, J. P., and Pennes, H. H.: Effects of mescaline and lysergic acid (d-LSD-25). *Am. J. Psychiat., 108:* 579–584, 1952.
2. Cattell, J. P.: The influence of mescaline on psychodynamic material. *J. Ment. & Nerv. Dis., 119:* 233–244, 1954.
3. Hoch, P. H.: Experimental psychiatry. *Am. J. Psychiat., 3:* 787–790, 1955.
4. Denber, H. C. B., and Merlis, S.: A note on some therapeutic implications of the mescaline-induced state. *Psychiatric Quart., 28:* 635–640, 1954.
5. Denber, H. C. B., and Merlis, S.: Studies on mescaline. VI. Therapeutic aspects of the mescaline-chlorpromazine combination. *J. Nerv. & Ment. Dis., 122:* 463–469, 1955.

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THE RESOLUTION AND SUBSEQUENT REMOBILIZATION OF RESISTANCE BY LSD IN PSYCHOTHERAPY

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At the American Psychiatric Association meetings on mescaline back in 1932, Sullivan stressed that in psychotherapy a drug can be therapeutic only by altering the relationship between the patient and the doctor. By establishing a changed relationship with the doctor, the patient has the possibility of changing his relationship to other people in a manner which is more satisfying to him. If mescaline and LSD act therapeutically, they do so by favorably altering a relationship. But let us remember that while a relationship may be altered in a favorable direction, it is not necessarily permanent. The direction can always be reversed, particularly if the relationship moves too fast.

Do mescaline and LSD move the relationship too fast? I recall a paranoid alcoholic treated in 1949, a burly brute of a man with great popping eyes. He was so guarded that he would not even admit to drinking. During the third mescaline interview (250 mg.), he talked with me for four hours. He relived the shame and agony of his mother's death and shed many tears. It was as though a stone had suddenly wept. He also related that everything he had been telling me for the past three months was a mass of ingeniously constructed

fabrications, nay even lies. I thought I had thrown open wide the gates of therapy, but I could not have been more wrong. He gradually became more suspicious, more demanding, more paranoid and finally refused to see me. The relationship had progressed too rapidly for him.

Does mobilizing unconscious conflict with mescaline or LSD help? A year ago I treated a girl who asked for LSD because she was blocked in her relationship to her therapist. She received LSD five times, in doses ranging from 50 to 150 mg. The paintings she did of the experiences illustrated no dearth of unconscious conflicts. She began to talk, but only with me and not with her therapist. She became depressed, had to be hospitalized for four days, then interrupted treatment for two months to go on a vacation. Her recent comments reveal some ambivalence about the experience: "It was the first time in my life I could talk to another human being and really experience what was going on within me. But it was premature. I was stunned by the disclosure of rape and incest."

Does insight obtained during LSD help? Another woman in the course of analysis acted out her transference by taking a lover. I pointed out in vain that her lover was only a projection of her incestuous wishes for me and father, that perhaps her husband might have some reservations. During LSD she gained a clear perception of this. She gave up her lover—*for a week*. Then the perception of him as father vanished. I cite this to illustrate that insights need not be permanent.

Does reliving painful experiences help? During LSD one patient reexperienced an incestuous relationship with her father which even today is crippling her relations with me. She refused further LSD.

Does overcoming resistance help? Two years ago Dr. Cholden and I tried to disorganize the pattern of regressed schizophrenics in a manner as to make them more accessible to treatment. There is no question that we introduced a temporary disorganization into their pattern of living. But despite the fact that LSD seemed to make them seek us out more actively, seemed to introduce a change into their psychic economy, it did not seem to have led to readaptation at a higher level of integration. I attempted, with one of the chronic regressed schizophrenics who was stabilized at a level of paranoia somatica, to reorganize the equilibrium by giving her LSD weekly. This girl had been sick for 10 years, had chronic somatic delusions of being dead, of having neither body nor nervous system for five years. The LSD had such a pronounced effect that it shattered her defenses. She now felt that she had a body and wanted to use it. She wanted to be out in the moonlight with me rather than poking around the ward. The LSD also mobilized tremendous rage and resentment against both her parents and myself. At this time, unfortunately, she was allowed to go home on a visit where she borrowed the family car and threw herself under a train. While LSD mobilized feelings and affects which had been successfully handled by nihilistic delusions, it also mobilized the supreme resistance: suicide.

I should like to raise the question in dealing with resistance: are we not considering it a road block to be blasted out of the way? Do we view resistance as a devil to be rooted out with the modern fire and steel—mescaline and LSD—when customary methods fail?

What is resistance? It is not a basic part of the personality which serves a definite economic function? It is a security operation designed to prevent the organism from being flooded with anxiety. The patient does not part with his security unless some new security is obtained in its place and in psychotherapy. The security lies in the relationship with the therapist.

Our function in therapy is not only to mobilize anxiety but also to make it tolerable in the therapeutic situation without the necessity of creating newer and better defenses or resistances. Unless we can do that, the LSD and mescaline experience may work against, rather than for, therapy. Let us not forget that the character armor is an integral part of the personality. One must remember that the patient has defenses because he needs them; they are not archaic residues, but a living part of his being. Smashing defenses, making the unconscious conscious, experiencing affect, reliving trauma, providing insights, are of use only when they alter the relationship with the therapist and lead the patient to a new and corrective experience with him and ultimately with

other people. I think LSD and mescaline highlight rather than afford an outlet to our dilemma in therapy.

The patient is blocked in his dealings with the therapist in good part because of his transference distortions of the therapist. Active efforts to improve the relationship, whether by drugs or other ruses, may rob the patient of the opportunity to see his distortion in dealing with the therapist, and the experience then may become isolated. Unless he can actually see the distortion in dealing with the therapist, he loses the opportunity to see it in dealing with others.

The helpless dependent state induced by LSD poses a dilemma. If a patient is not looked after during this long period of anxiety and dependency, he will find the experience too disturbing to continue. If he is looked after by someone other than the analyst during this helpless dependent state, there occurs a splitting of the transference. If he is looked after by the analyst, then he develops a helpless dependency on the analyst, not based on transference, but rather on a realistic necessity.

What we are proposing is that a psychosis is beneficial. Now this has been maintained, but the evidence for it is not convincing. While we are saying that the acute psychotic illness should facilitate treatment, this does not seem to be the case. If so much panic, desperation and discomfort are endured, it may become necessary for the patient to mobilize all possible defenses.

At present we are studying two borderline patients who get 50 micrograms of LSD intramuscularly, once a week. We obtain recordings before, during, and after LSD to study the fate of resistance. Let me illustrate from one case how overcoming resistance with LSD is followed by renewed resistance. Her character resistance is an intellectual defense against feelings:

First day: She felt irresponsible. It was a good feeling—tremendous release from emotion. The following day she went out and got drunk (acting out).

Second day: She felt her defenses crumbling. The veneer was cracking. She felt closer to people. The following day she started to eat insatiably and eventually her weight went up to 200 pounds.

Third day: She had a strong feeling toward the therapist. She attempted to diffuse her feelings by talking to everyone but the therapist. Subsequently she asked for a new therapist.

Fourth day: Under the influence of LSD she recognized her intense sexual preoccupations, but refused to talk about them, saying it was not safe to talk about this question during LSD. She called the therapist that night and told him she was ready to talk. She then withheld the information for three months.

Fifth day: She gained the insight that she was a demanding little girl within her external intellectual facade. Instead of following up this insight, she developed an obsessive preoccupation about becoming schizophrenic.

Conclusion

It may be stated that both mescaline and LSD may increase blocking and autistic withdrawal. These drugs may also overcome blocking and resistance and increase rapport, as well as unearth unconscious material. They can release painful and repressed affects, lead to fresh insights with reliving of painful experiences allowing the patient to become aware of his feelings. These drugs can increase dependency, mobilize resistance, lead to splitting of transference, isolation, denial and even conscious withholding. The unconscious material may be repressed again and the insights wiped out. Although work with LSD is more difficult than without, I feel that in some measure it is satisfying to both patient and analyst. It increases our understanding of psychic processes and relationships. It permits the possibility of new perceptions, new-found empathy and understanding. With proper therapeutic handling, these intuitive processes can be kept in awareness and integrated into the conscious part of the personality.

Summary

LSD provides an effective method of overcoming resistance. It causes a reliving of previous experiences (1). It brings to the fore painful and repressed affects allowing the patient

to become aware of his feelings. It liberates unconscious material often in the form of hallucinations and perceptual changes. Dramatic insights occur. However, these affects may in turn mobilize defenses. The LSD experiences may then be utilized in the service of resistance.

BIBLIOGRAPHY

1. Sandison, R. A., Spencer, A. M., and Whitelaw, J. D. A.: The therapeutic value of lysergic acid diethylamide in mental illness. *J. Ment. Sc.*, *100*: 491–507, 1954.

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THE ROLE AND REACTION OF THE PSYCHIATRIST IN LSD THERAPY

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It is the purpose of this paper to direct attention to the therapist who participates in an LSD session. LSD alters the psychotherapeutic relationship, and this is exemplified, not only in the increased emotional lability and freedom of association, but also in the psychotherapist's reactions and expectations. It may be said without question that the behavior of a patient affects the therapist, and by examining some of the therapist's experiences in psychotherapy utilizing LSD we can increase our understanding of its effect on the patient and the therapeutic process as a whole.

The following observations for the most part are based on therapy with two borderline neurotics seen four times a week, each of whom received 50 micrograms of LSD once a week about two hours prior to the therapeutic hour.

As I recalled my various sentiments regarding these LSD hours, one stood out in particular—a tremendous sense of solicitude. Others have mentioned that holding the hand can often be extremely comforting to the patient at such a time. Of course, such a gesture was out of the question for me. As part of a scrupulous research team, I knew that the setting on "LSD days" was to be identical with other days: the same room, the same time of day, and as far as possible the same total life situation. Odd, then, to remember in the first few months of the LSD experiments that instead of awaiting the patient's arrival in the office, I would seek him out and conduct him to the room. I remember adjusting the venetian blinds with great care on these days to diminish the painful brightness of the room for the patient. When the patient wept, my hand also reached for the Kleenex more swiftly than usual.

Whence came all this solicitude? True, early in treatment, the patient often appears more helpless and stumbling, tremendously anxious and frightened—as was I. The therapist, then, finds himself reacting with anxiety, remorse and solicitude. Even though the therapist may not himself have planned the experiment, he may feel the responsibility for the anguish the patient experiences. There is also engendered within the therapist a certain sense of helplessness. The administration of LSD sets in motion certain processes within the patient which are out of the therapist's and the patient's control.

In watching Dr. Bercel's fascinating film of "The Schizophrenic Model Psychosis Induced by LSD", which he presented at the American Psychiatric Association meeting in May, 1956, I found myself observing the doctor and the audience. Why was the audience tittering? And why, when the patient described being transported by marvelous sensations, was the physician repeatedly asking him to eat? He *interrupted* him forcibly. When the patient complained, the physician said, "I thought the experience was getting too intense for you." Surely the psychiatrist was not so overwhelmed by the patient's refusal of food. Here was just the experience he wished to record—a subject with an impressive reaction to the drug. Yet, he attempted to interrupt the drug effect. The psychiatrist's anxiety was so forcibly communicated that it aroused the same emotion in the audience.

In the early LSD hours I found myself less

inclined to question or to attempt to relate a present experience to a past one, or vice versa. In fact, during the LSD studies, the patient verbalized without interruption. My first impression was that this related to the same sense of solicitude mentioned before. "Poor guy, he's contending with quite enough. Why increase his discomfort?" That may have something to do with it, but would such a solicitude exist in the normal therapeutic hour? I doubt it. I was an onlooker of an experience *within* another person. These patients were less with me in the office. This lack of interpersonal awareness showed itself to me in minor ways. I found myself less concerned on these days with what I said, or my state of dress, *because* I felt myself an observer of a process rather than an interactor.

The patients experienced a similar lack of interpersonal awareness. One said, "I am entirely apart, in a different world, my private dream world, and yet I am aware of this world too." Another patient was attempting to describe how the defenses against loving the therapist were crumbling, and mentioned a sense of self-consciousness in describing them. When asked how the self-consciousness related to the therapist, he denied a connection, stating emphatically, "You're just a piece of furniture!"

This example illustrates the intensity of the patient's feeling for the therapist, and yet the feeling is dissociated from the person of the therapist. Whether a patient speaks of a sense of closeness or vents his fury, these emotions are experienced by the therapist less warmly or painfully than outside the LSD experience. Even though one learns with experience in therapy under LSD that it is not only possible but useful to question and interpret, the sense of distance from the patient during LSD hours remains.

It might be questioned as to whether there is something contradictory in feeling a strong concern for the patient and at the same time a sense of distance. When the therapist feels solicitude and when he is somewhat helpless to alter the course of events, he has already removed himself from intimate interaction with the patient and has become an observer.

To summarize, when a patient receives LSD, the psychotherapeutic relationship is altered. The LSD situation produces solicitude, anxiety and helplessness in the therapist, and may increase the feeling of distance between the therapist and patient. The ability to relate successfully is the essence of treatment. LSD is given with the hope of establishing a better therapeutic relationship and of undermining defenses which prohibit the development of such a relationship. And yet the secondary effects of the administration of this drug can defeat the very purpose which one has set out to achieve.

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COMMENTS ON THE PSYCHOLOGICAL EFFECTS OF MESCALINE AND ALLIED DRUGS

IAN STEVENSON

This report refers to observations of incidental and unintended therapeutic effects of mescaline and LSD and some comments on their relevance to our understanding of the schizophrenic process.

Most reports of the therapeutic value of these agents have stressed their role in freeing the expression of thoughts and emotions connected with events of the past (1–4). I have observed this in a number of our subjects, volunteers from our staff and medical students. We have not used these drugs on patients. I believe that this abreactive effect is somewhat greater with the hallucinogenic drugs than it is with the barbiturates. Mescaline and LSD do not dull consciousness. Therefore, a person is able to recall the past under their influence while preserving at the same time full vividness of present experience.

Other psychological effects of these drugs

which have not yet received the attention they deserve are the changes in the perception of present experiences. Recalling the past, in my opinion, has value only insofar as it leads to a different point of view of the present; this different experience of the present, therefore, may be of much therapeutic value. Mescaline and similar drugs alter the present experiences of the subject in ways which may well be remarkably therapeutic.

These drugs in some people can increase the experience of beauty. The intensity of the colors and the fascination with colors and shapes which many subjects experience leave an unforgettable residue of appreciation for the beautiful. If the subjects look for beauty and see it where they did not see it before, is this not therapeutic?

The subject's perceptive experience may pass from ordinary perception through illusions to hallucinations, while all the time he thinks he sees the same object. What is changing? Not the walls and ceilings; of this he is assured by others in the room. Therefore, the changes must be part of himself. But what part? He has a different perception of the world around him, but is it necessarily a false perception? If I put on my glasses and see the details of the distance more sharply, no one could say that I am hallucinating! But if under the influence of mescaline I see color and forms which I did not see before, they say I am hallucinating. But is this necessarily so? It may be that I really have achieved a new and better vision of external reality.

The brain has been compared to a great filter which screens many stimuli from the mind. Mescaline may reduce the filtration powers of the brain and let in some of the beauty which our brains ordinarily hide from our awareness. Gastaut (5), from a neurophysiological point of view, seems to have meant something similar when he suggested that the fundamental action of LSD consists in decreasing the "filtering" activity of the central nervous system and thus increasing the number of stimuli reaching awareness. Although I will not deny that some and perhaps many false perceptions may occur under the influence of these drugs, I think it is a mistake to overlook the possibility that these drugs may bring us, at least partially, into contact with a world of which we know little and should know a great deal more. I am emboldened to make this suggestion by my readings of the experiences of clairvoyant persons, some of whom have been most sensible and critical observers, and have given accounts of their perceptions in different states of consciousness. Their descriptions of altered perceptions of space, body and time, and of synesthesiae bear a remarkable resemblance to the reports from persons under the influence of mescaline (6).

The significance of this aspect of the mescaline experience is that the subject may come to have a different attitude towards perception. Most persons who have thought much about perception have discarded the theory of naive realism. That is, they know intellectually that the sense data they perceive differ from the real object which is the source of the stimuli for these sense data. I say they know this, but they, nevertheless, do not know it with conviction. Such conviction can come during and after a mescaline experience. The difference resembles that between reading a play and seeing a play performed or, better still, performing in one. The ultimate truth about perception still evades us. It may be that our every day perceptions do indeed present to us one aspect of reality (7), and that in other mental states (such as that induced by mescaline) we experience another aspect of reality. What matters is that we should avoid identifying our sense data with the totality of the objects perceived. After the mescaline experience, the subject may have a heightened realization that his every day sense data only present (and most imperfectly) a part of the real world around him. This may bring him further along the path of detachment from sense data, towards the non-attachment (and accompanying peace) of which mystics tell me.

Another relevant experience is the subject's realization of the instability of his own perceptions and of his own thought images. He may have acquired a strengthened awareness of his own Self. Some subjects become temporarily lost in the imagery evoked by the drugs. They cease to distinguish observing Self from images and, losing sight, enter a state which may be indistinguishable from dream states, deliria or schizophrenic reactions. Other subjects experience something which I compare

to a spectator's remembrance of himself in a theater. Sometimes the playgoer becomes lost in a play. We say that he identifies himself with the actors and the stage. But then for a moment or longer, he may remember that he is sitting in his seat watching the actors. Something like this may also explain what happens during the mescaline experience. Watching the images pass before the observing Self, the subject may suddenly have a realization of the separateness of that Self from the images. Thus, he may come to distinguish what Jung (8) has called the objective psyche and the Self. In this respect, his experiences may resemble mystical states. It reminds one of the Hindu's distinction between Atman and non-Atman.

I have emphasized that the experiences and effects, mentioned above, do not come to all subjects. Much of modern psychotherapy seems excessively preoccupied with the past to the exclusion of techniques which will change the patient's experience of the present and his way of viewing his existence. Mescaline and similar drugs may offer means of helping patients to such changes.

The value of these drugs in clarifying our understanding of schizophrenia has been debated by competent observers holding opposite views (9, 10). At present, one can only offer a tentative opinion. I should like to review some of the similarities and differences of schizophrenia and the drug-induced mental states. Impairment of perception, thinking, and affect occurs in both with preservation of orientation and unclouded consciousness.

Some investigators have suggested that the effects of the hallucinogenic drugs are not pertinent to the study of schizophrenia because they induce a toxic psychosis. However, I cannot agree with those who believe that the effects of mescaline (and other similar drugs) closely imitate the phenomena of febrile deliria and other acute brain syndromes. Although the visual perceptive disturbances of the mescaline experience resemble the perceptive disorders of febrile deliria, that similarity alone does not warrant our believing that mescaline produces nothing but a "toxic psychosis". In the febrile deliria, consciousness is impaired; and in the mescaline psychosis, perceptive disturbances (including hallucinations) occur with clear consciousness. In this important respect, the mescaline state resembles schizophrenia more than it does febrile deliria. These facts remind us that our nosological concept of toxic psychosis is no longer of help. Mescaline certainly is a toxin, but so are phenobarbital, alcohol and caffeine. Each of these toxins produces different psychological effects. The question at issue is whether some or all of the symptoms of schizophrenia are mediated by an endogenous toxin. Under the heading of toxic psychosis, we have to consider a number of different toxins, external and internal, each having different effects, and each acting upon different organisms whose individual responses add further to the variety of observable phenomena.

Among the differences between the mescaline psychosis and schizophrenia, we must recall that disturbances of perception do not occur in all schizophrenic patients. Disturbances of auditory perception are relatively common in schizophrenia, and less often observed in the mescaline psychosis. Disturbances of visual perception occur much more frequently with mescaline. Disturbances of thinking do not occur in all subjects under the influence of mescaline. In fact, we find an extraordinary diversity of symptomatic patterns both in schizophrenia and in subjects under the influence of these drugs. It seems likely that what we call schizophrenia is really a congeries of disturbances having some similar symptoms, many distinct and many of different origins. The symptom of fever was similarly confused when physicians were just beginning to distinguish many origins of fever—e.g., typhus, typhoid, etc. One also recalls Bleuler's phrase, "the group of schizophrenias." More recently Meduna (11) separated out one of the group of schizophrenias which he called oneirophrenia, a dream-like state. In this condition, perceptive disorders are prominent and thinking disorders slight. The mescaline psychosis more closely resembles this group than it does the so-called classical schizophrenia.

A number of different factors enter into phenomenological data both of the schizophrenias and of the mescaline psychosis. We must consider all of these factors in order to

understand the wide variety of symptomatic patterns in both groups. In the case of the mescaline psychosis, we must pay attention to the following variables: different abilities to detoxify and excrete drugs; different sensitivities of the cells in the central nervous system to the action of the drug; different thought contents which may be released; and different reactions of the subject to the altered perceptual experiences of the body and environment, and to the welling up of previously unconscious images and unfamiliar emotions.

Schizophrenia and the experimental psychoses are most similar in that the subject has uncontrolled and unfamiliar thoughts and feelings. The heightened speed of imagery and the disturbance of thinking are remarkably alike in both the natural and the artificial psychoses. The subject under the influence of mescaline is frequently absorbed in his fantasies and does not wish to participate in any interview or testing. If he is prevailed upon to undertake some simple test, such as the serial subtraction of 7 from 100, he may start off well enough, but then almost immediately forgets what he is doing, presumably because some new thought has invaded his field of awareness. The same defect of attention interferes with his ability to abstract. He cannot hold one thought long enough in the field of consciousness to bring another one up to it for comparison. Since he cannot get two thoughts together, he cannot abstract whatever they have in common. Similar defects of attention probably underlie the impaired thinking of patients with schizophrenia.

What appears further depends upon a number of other factors. The subject taking mescaline is fortified by the knowledge, which he usually preserves, that his experience is transient and controlled. The patient entering the strange world of schizophrenic perceptions has no support. His alien thoughts are induced by some current and continuing stress. This may further intesify his anxiety.

An experience of one of our subjects illustrates how these two conditions may become almost inextricably entangled. While under the effects of mescaline the subject experienced an unusual amount of depersonalization; that is, his sense of Self was diminished rather than enhanced. The effects persisted and were by no means entirely over when it was considered safe to take him home. The next day he seemed to have recovered, but the third day he relapsed into a state of reverie and idleness. Instead of doing his usual work, he passed his time in fantasies. These were accompanied by some alarm at his condition, and he began to have bizarre hypochondriacal ideas about himself. He expressed ideas about having various grave diseases, such as paresis, and demanded tests for them. He was treated as if he had been a patient with schizophrenia. He was not admitted to a hospital, but was seen for psychotherapeutic sessions once a day for a few days. The disturbance gradually wore off, and after a week the subject had recovered entirely and with considerable insight. During the course of the interviews the subject revealed a life-long habit of daydreaming, especially during times of stress. He had been undergoing an unusual stress in his personal life at the time he took the mescaline. About the whole experience he commented, "I guess the mescaline provided me with a model for the solution of my problems."

I am far from insisting that these drugs induce states which exactly resemble schizophrenic conditions. Quite clearly they do not. But I think we can say that both processes have common factors. They may have different origins and their final directions again diverge. Somewhere between they seem to travel along similar paths. They exhibit psychopathological disturbances which are nearly if not exactly identical. This similarity promises much of value for the future expansion of our knowledge.

BIBLIOGRAPHY

1. Sandison, R. A., Spencer, A. M., and Whitelaw, J. D. A.: The therapeutic value of lysergic acid diethylamide in mental illness. *J. Ment. Sc., 100:* 491–507, 1954.
2. Frederking, W.: Intoxicant drugs (mescaline and lysergic acid diethylamide) in psychotherapy. *J. Nerv. & Ment. Dis., 121:* 262, 1955.
3. Denber, H. C. B., and Merlis, S.: A note on some implications of the mescaline-induced state. *Psychiatric Quart., 28:* 635, 1954.
4. Cattell, J. P.: The influence of mescaline on psychodynamic material. *J. Nerv. & Ment. Dis., 119:* 233, 1954.
5. Gastaut, H., Feuer, S., and Castells, C.: Action de la diéthylamide de l'acide d-lysergique (LSD_{25})

sur les fonctions psychiques et l'électroéncephalogramme. *Confinia neurol., 13:* 103, 1953.
6. Payne, P. D.: *Man's Latent Powers.* London: Faber & Faber, Ltd., 1938.
7. Moncrieff, M. M.: *The Clairvoyant Theory of Perception.* London: Faber & Faber, Ltd., 1951.
8. Fordham, M.: The concept of the objective psyche. *Brit. J. Psychol., 24:* 221, 1951.
9. Wikler, A.: The use of drugs in psychiatric research. *Am. J. Psychiat., 112:* 961, 1956.
10. MacDonald, J. M., and Galvin, J. A. V.: Experimental Psychotic States. *Am. J. Psychiat., 112:* 970, 1956.
11. Meduna, L. J.: *Oneirophrenia. The Confusional*

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REMARKS ON LSD AND MESCALINE

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A number of drugs are used today in conjunction with psychotherapy: barbiturates —especially sodium amytal; amphetamine in the form of benzedrine or the related desoxyn; ether; CO_2; mescaline; LSD; and others. Each time one of these treatment methods was introduced, a considerable amount of literature developed claiming specificity in its use. It was claimed that barbiturates used in conjunction with psychotherapy had specific virtues and values which the other drugs did not have. The same was stated about CO_2, ether, and now for mescaline and LSD. There are, of course, variations in the action of these different agents. Nevertheless, basically they all accomplish something similar.

The actions could be described as (a) euphorizing, (b) disinhibiting, (c) relaxing, (d) cathartic, (e) activating or stimulating, and (f) anxiety-producing. The widely used narcotherapeutic methods with sodium amytal accomplished their task by relaxing and disinhibiting the patient, producing a frame of mind in which the patient became more communicative and released material which was formerly not obtained or blocked. The technique with barbiturates was essentially an anxiety-reducing and eliminating form of treatment. Amphetamine or desoxyn has different actions in different individuals. In some it leads to relaxation and disinhibition, which in turn leads to catharsis, while in others it is definitely stimulating, tension-producing, and at times even anxiety-producing, leading to disinhibition and catharsis. Mescaline and LSD are essentially anxiety-producing drugs and in addition underscore and magnify the patient's symptomatology. The increase in anxiety and fear of loss of ego integration could lead to releasing of material which was formerly not obtained or was repressed. In some individuals, mescaline and especially LSD have also a relaxing and somwhat euphorizing effect. It is, therefore, possible to obtain psychic material not revealed before, owing to suppression or repression by using drugs which either relax or stimulate or do both. The question arises whether psychodynamic material obtained by these various drugs is or is not very similar one to the other. Does a patient under sodium amytal reveal different psychodynamic material than with benzedrine or LSD? If the material is similar then, of course, any drug which is able to remove suppression and repression of psychic material could be used as an adjunct to psychotherapy. On the other hand, if the drug should have a certain specificity, then it will have to be demonstrated what kind of psychic material is apt to be produced by one or the other of these drugs. Careful studies of a large number of patients who were under the influence of different drugs did not reveal to us any marked specificity as to the use of these these different agents. This is especially true in those patients in whom different drugs were used at different times.

Studies of the literature do not reveal much regarding their specificity. Sometimes exactly the same mechanisms are claimed for amphetamine or mescaline as were described years before for barbiturates or CO_2. A much more pertinent issue than the specificity of release of psychodynamic material would be the question how far a patient responds better for psychotherapeutic purposes to one drug than to

the other. It is conceivable, if we base ourselves on metabolic, psychological and social factors, that one patient would respond better to one kind of approach than to the other. This, of course, is true for psychotherapy, too, without the use of any adjunct. But it is probably even more true if certain methods are used in addition to psychotherapy. It is conceivable that the biochemical organization of an individual, of which we know so little, is such that his psyche will be more influenced by amphetamine than by barbiturates. On the other hand, it is also possible that the experience which the person undergoes under the influence of these drugs has a different psychological impact on him which again could lead to more or less cooperation of the patient in psychotherapy.

I would like to stress the fact that in the same way that we are speaking about facilitation of these drugs with psychotherapy we can also discuss the reverse because the reverse is also observed. In some patients some methods could impair the transference relationship and block the patient's cooperation with the psychotherapeutic attempt. The facilitation of psychotherapy with these aids is by no means uniform.

We saw patients under the influence of mescaline or LSD who refused to participate in psychotherapy because of the experiences they had during the period of drug intoxication, while in others just the opposite took place. The suggestive power of some of these adjunct therapies and the conviction of the therapist as to what kind of therapy he uses should not be forgotten. A therapist firmly convinced that LSD will produce results, while sodium amytal will not, will, of course, have much better results with LSD than with sodium amytal.

In addition to the above-mentioned factors which play a role in the response of a patient to one approach more than another, a few other factors will have to be added. A very important one is what the patient expects of treatment. Many patients form an "ideal picture" of the therapist and also about the procedure to which they would like to respond. There are, for instance, patients who prefer psychotherapeutic methods which use somatic adjuncts, while others are very much against them. There are some patients who would like to submit to a psychotherapeutic procedure whose theoretical foundations are in agreement with their own ideas about psychic functioning, while others do not make such demands. One patient, for instance, wants to be rendered unconscious or would like to have a profound existential experience as can be produced by mescaline or LSD, while another patient resents and revolts against being rendered unconscious or being exposed to ego-shattering experiences.

It is important to emphasize that if a patient is treated for a longer period of time and his psychodynamic structure is known to the therapist, the material he produces is usually not much different from that which he produced before drug exposure. Occasionally it happens that material is released which formerly was repressed. Of course, a great deal of material can be gathered in a comparatively short time in patients whose psychodynamic structure is not known. The only advantages we are able to see in the use of LSD or mescaline for therapeutic purposes are that they do not interfere to a great degree with consciousness, and that the patient remains in full contact with the therapist and is able to report his experiences. Cattell (1), who recently investigated the psychodynamic and therapeutic aspects of LSD and mescaline, reached the conclusion that mescaline produces non-specific and personality-specific responses. Even those clinical and dynamic trends which were unrecognized or unemphasized prior to mescaline can be recognized as consistent with the personality of the patient; only rarely was such material considered somewhat alien by the patient. It was not possible to predict the dynamic content upon which the patient would concentrate during a drug experience. Even though some of the basic personality manifestations were discernible in successive drug experimentation, neither mescaline nor LSD gave a complete and undisturbed picture of the basic personality. From the viewpoint of psychodynamic investigation, the drugs have a very great value. One gains a great deal of information relative to ego strength, emotional regulation, ego defenses, and the handling of repressed material. Their therapeutic use in a specific sense is, however, another matter. In the latter, these drugs are not especially successful. Emotional catharsis, release of hostility, abreaction of

traumatic events, release of repressed material could be at times therapeutic. In many instances, however, they are not. We should not forget the psychotic individual does all this quite often spontaneously as part and parcel of his clinical manifestations without showing any improvement. Furthermore, in many instances the transference relationship during the drug-induced state is markedly distorted and is not too conducive to psychotherapy. It has to be emphasized that psychotherapy is not only a process of analysis, but also of synthesis. Unfortunately, the latter is the more difficult to accomplish, especially in psychotic individuals. We, therefore, believe that LSD, mescaline and many other drugs can be used as adjuncts to psychotherapy, but it has not been proven that they are superior to drugs already in use. In our experience they cannot be compared with psychotherapeutic results obtained in patients where tranquilizing drugs were used to reduce instead of to stir up the patient's symptoms. Further investigations in this field, however, are very much in order. The understanding which could be gained into psychodynamics and the relationship of psychodynamics to physiodynamics are of utmost value and will influence indirectly our therapeutic understanding.

BIBLIOGRAPHY

1. Cattell, J. P.: The influence of mescaline on psychodynamic material. *J. Nerv. & Ment. Dis., 119:* 233, 1954.

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VERBATIM RECORDING AND TRANSFERENCE STUDIES WITH LYSERGIC ACID DIETHYLAMIDE (LSD-25)

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Previous reports have stressed the value of LSD as an adjunct to brief and intensive psychotherapy (1–4). This communication concerns a three-hour verbatim recording, illustrating its use in connection with the emergence of the transference and the concomitant countertransference. While verbatim recordings do not generally include the almost endless number of variables required for a "total" study, it does provide verbal interactions of the total process. The delicate doctor-patient relationship expressed through interrelated groups of words is carefully delineated, and their meanings thus conveyed to different observers.

During the reaction with 25 to 50-microgram doses of LSD, ego enhancement occurs simultaneously with ego depression. Advantage may be taken of the reconstructive potential and integrative functions of the ego to provide insight into conflict situations not hitherto readily accessible to the patient (1). Our results with 100 micrograms or more of LSD indicate that the processes functioning in the personality structure of the non-psychotic subject may be modified as follows (5): (a) Awareness and recall of the experimental setting, (b) increased fantasy with limited emergence of autistic ideation, (c) facilitated interpretation of symbolic processes, (d) acute awareness of need to maintain conscious volitional control of self, (e) regressive modes of defense and self-preoccupation, (f) mounting anxiety, (g) dysfunction of affect control, (h) depressive processes exceeding the euphoric components, (i) alternating periods of disturbance in perception, (j) rarely hallucinatory phenomena with some awareness of reality simultaneously, (k) intensification of interpersonal bonds with members of the group or group leader either with distorted dependence or hostility, or both, (l) paranoid structuring of both people and circumstances, (m) psychosexual stimulation induced by either external events or by the other items listed here, and (n) rare improvement in performing under specific test situations.

If the foregoing changes of behavior were all modified by the word "slight", we would have a better picture of the patient who has received therapeutic amounts of LSD (25–50 micrograms). Here the forces of ego enhancement are supported by the intense relationship with the therapist. While the patient reacts

to both LSD and the therapist, the latter plays the major role during a therapeutically focused LSD reaction.

The verbatim recording represents three of five continuous hours of interview with an allergic 35-year-old male who had previously had 250 psychotherapeutic sessions without LSD.

Transference-Countertransference

This communication illustrates also the conduct of an analytic session with a patient having received LSD. The elaborate condensations of psychiatric reports more often indicate only the attitude of the therapist toward the illness under discussion, toward the patient, toward his therapeutic results and the opinion of his colleagues. All of these condensations are highly contaminated by the reporter through symbolic processing, both conscious and unconscious. The first necessary step in attempting to achieve a total or transactional view of the psychotherapeutic process is lost without verbatim data.

The verbatim recording directly exposes, in part, the nature of the countertransference through an accurate record of the verbalizations. This important but rarely studied aspect of the usual psychiatric report is protrayed by the interaction of the transference-countertransference. Thus, the system is isolated and a true fragment of the transaction is made available for study. A complete report of this process will be published *in extenso* elsewhere.

Summary of the Verbatim Transcript (250th Session)

A patient who realized that a threatening problem created an impasse in his analysis requested that he be given LSD, and received 50 micrograms orally. At the beginning of the session the underlying problem was unknowingly revealed. "One of the first thoughts that came to my mind as I held the glass of LSD was, 'I wonder if this is really anything. . . . I thought anything that's medicinal should taste'."

The patient then related a dream, described as having an "Oriental" atmosphere, in which he was a student sitting in a classroom. He felt that a course would have to be completed before he would be released to return home. The professor in the dream was characterized as the Soviet type, who answered his questions pertaining to release with only a smile. In reluctantly discussing the dream, the patient tried to discern what was meant by "Oriental" and said, ". . . suddenly the word *distrust* came out. . . . I don't fear you! *I fear what you may uncover! Or, I fear what we may uncover in myself!*"

He then brought up an important symptom, previously consciously withheld from the therapist, the return of itching and scratching; the onset of which he connected with problems encountered in his work. He finally realized that his allergic reaction may have been caused by a disagreement with his wife's psychiatrist whom he regarded as pompous, smug, and unyielding.

The patient recounted a second dream: He was in an arena rehearsing for a show. A news columnist told him afterwards that his performance was highly praised. Associations: ". . . this particular columnist is in reality very arrogant, has very little, if any, feelings for his fellow man, and does everything for effect and show and whatever will make exciting news. He has to blackmail, pressure, influence. . . set himself up as a sort of god." This led into a disordered account of experiences and incidents connected with show business. Finally, the patient realized that he had evaded discussion of the second dream and decided to return to "that columnist thing." He said, "This must be Dr. Abramson. . . it wasn't until this very day that I could actually think it, let alone say it. . . . It wasn't until LSD. . . that I was able to come up with the words 'arrogant' and 'self-centered'."

As the session continued the patient's insight became evident, and feelings and emotions hitherto camouflaged were brought out without the intense guilty fears that had kept them submerged. He said that a tremendous amount of aggression in him was wasted because he did not know where to "aim it".

The patient related a third dream. He was a student in the Navy, being taught how to bail out of an aircraft flying over water. He and another man were out on a pole which extended from the aircraft. The other man jumped off first. He was afraid to jump, and as the aircraft flew closer and closer to the ground, he

simply walked off the pole onto the beach. The naval officers marking him were displeased. The patient said it may have represented an unconscious fear on his part with regard to taking LSD.

Near the end of the session he brought out that, for the first time in his life, he was able to "sell himself"—his talents. In other words, he was no longer as hostile toward the figures of authority.

Discussion

Analysis of the transference distinguishes psychoanalysis from other forms of psychotherapy. Concepts of the transference are derived from a vast source of psychoanalytic literature. But, raw data of the doctor-patient interview are very rare.

I have noted in the past five years of work with LSD given hundreds of times that an intensification of the relationship with the patient or subject has developed. This has been especially true when LSD has been administered during psychoanalysis. The patient with one hundred or more interviews and considerable dream analysis before receiving LSD has acquired some insight into the mechanisms of the unconscious. It is my belief that administration of therapeutic doses of LSD to such patients may expedite advantageously analysis of parts of the transference.

Mobilization of the Unconscious Homosexual Conflict

In the first meeting following the LSD interview outlined in the foregoing, the patient was reminded that, although he had touched on his relationship with the therapist from time to time, he had never before consistently and definitely consolidated his position. In the preliminary portion of the verbatim recording of this session, there was no word or statement regarding homosexuality.

Patient: Well, this brings us back, I think, to the time I started with these mysterious or undefinable fears that I have regarding my masculinity. . . . I had certain fears or anxieties regarding my masculinity or perhaps lack of it, or of certain forms of homosexual tendencies that are not outright but subtle in act or thought. So now, two years later we are right back at this point, and I still don't know what this "X" is. But I know a little more about how things came about so that "X" took place in me. I know a little more about it as far as development is concerned, but as far as the actual mystery itself, the "X", I don't know anything more now than I did then. And that, to me, is the thing which I am probably most afraid to face.

Doctor: You just said, though, that you distrust me and have fears in relationship to your masculinity.

Patient: What was that again? I distrust you with relationship to my masculinity?

Doctor: That's right. There are two things that you talked about, one following the other. We know that during your LSD session on Wednesday it became quite clear that in certain areas you distrusted me, unconsciously. This now came to the foreground. Today you say that you are back where we started; that although your fears of masculinity are better understood by you, and realistically eliminated because of your improved heterosexual behavior, you still have them nevertheless. And I asked, now in relationship to me, to the analyst, but specifically in relationship to me, whom you distrust—

Patient: I'm all in a cloud now.

Doctor: You've been talking about two things: one, about the analysis, and two, about your masculinity. Put them together.

Patient: I don't get it, except for this threatening feeling that I have with regard to exposure by you. You're implying, I gather, that my fear of masculinity is now linked with this?

Doctor: I'm implying that I might be a threat to your masculinity; to your being a male; to your developing heterosexually; and that these fears might have originated in your childhood and now could be hooked up to some of the dreams that you had which were plainly homosexual.

Patient: I don't know.

Doctor: Well, there's no hurry about your getting the connection. It's a rather subtle connection and I might be wrong.

Patient: Unless it's the "father thing".

Doctor: Well, of course, it's the "father thing"!

Patient: Well, I mean, this was—I thought this was so basic. Isn't this generally the case,

that the analyst and the patient is the "father thing"?

Doctor: The analyst can be many people, but here, in what way are you specifically afraid of—

Patient: Well, now I see what you's getting at—the sexual feelings toward my father, or fears of my father, or competing with my father. I don't know what I'm talking about; I'm just going along according to what you said up to now.

Doctor: Do you remember you got quite upset when we had to start the analysis and you had a dream of men lying over as if they were going to get rectal examinations? Does that ring a bell?

Patient: Well, I remembered the dream and I remembered discussing the fact that it reminded me of my father and the way he died. I mean the whole session was about that; the type of operation my father had and so on. But as far as the memory is concerned—

Doctor: But there was a fear in you connected with that.

Patient: A fear in me?

Doctor: That's right! You got quite anxious.

Patient: I don't remember. That was some time back. I remember the dream and I remember the—

Doctor: At that time I said it would be better not to discuss it too much. Do you remember?

Patient: Yes. So what was that?

Doctor: Well, maybe some of the fears about your own masculinity were involved in that dream.

Patient: Well, did I say that I was sexually excited in the dream?

Doctor: No, no. I'm not speaking about sexual excitement; I'm speaking about fears now.

Patient: Well, wouldn't the fear be produced, or more highlighted, by a feeling of some excitement—this sexual stimulus or stimulation or whatever it is, that was producing fears?

Doctor: It may or it may not.

Patient: Couldn't it be the conflict, in other words, the feeling wanting to take place and the—I can't put into words what I'm trying to say, but I have an idea of what I want to say. In other words, what you're saying about his particular dream and—

Doctor: And many dreams like it that you had, because you had quite a number. And many dreams you've had regarding your father have given rise to a great deal of anxiety and many of them had to do with the genitals or the rectum, remember that?

Patient: Yes. Or bandaged hands.

Doctor: That's right, bandaged hands.

Patient: Some form of violence.

Doctor: Or using the hands—preventing the hands from being used.

Patient: Hmmm. Could I have been beaten or something?

Doctor: I don't know.

Patient: As a very young child, playing with myself or something like that?

Doctor: It happens.

Patient: Yes, I know, but a thing like this I certainly would remember.

Doctor: Not necessarily.

Patient: It didn't happen in the years that I can remember. Unless it may have happened in some subtle way that I wasn't aware of it. In other words, I may have been getting—just now that "Roman galley slave thing" came back to me. Remember that dream I had a long, long time ago? One of the slaves looked like my father, and they had bandages on their wrists. Also, circumcision has been coming up, or did lately—what with the memory of that circumcision I went to where everybody was fainting and so on. And a lot of these people were present at my sister-in-law's party. Remember that? Maybe when I'm criticized I feel that I'm being castrated, to a degree. Maybe I feel that whatever masculinity I have is in my ability to perform, and if this is threatened, in a sense I'm being circumcised or castrated. Is that possible?

Doctor: It's possible that there is a connection.

Patient: Because look how much importance I put into reaction. My whole life up until very recently went much further than just my job, see? Before I cared very much about —up until quite recently my whole life was that way, to impress and so on. It's an old typical thing! Now, I'm very happy to say that most of that has been changed. In fact, a lot of it

has been changed. But yet that feeling is still very strong when I'm performing.

The attitude of the patient following this type of verbalization changed in a favorable direction. His unconscious fears, so well portrayed in his dreams, apparently diminished. The unconscious components of homosexual drives became less conspicuous in his dreams. Eczema definitely associated with unconscious fears of homosexuality diminished or disappeared. The influence of LSD on analysis of the transference was of utmost significance in expediting this phase of the patient's recovery.

Relationship with Minority Groups

Another one of the important aspects of the patient's personality structure uncovered by LSD was his unconscious hostility toward minority groups. The patient's professional work brought him into contact with colored show people. His relationship with them improved markedly as indicated by a recorded excerpt from a session some months after the LSD interview.

Patient: But one thing I did notice on my last tour; I used to have the habit if I was with a colored band, and I was eating with them or chatting with them, I'd become one of them. I almost talked like them, not too obviously, because then they would say, "Oh, man, what are you doing?" I'd try so hard to be like one of them and say, "See, I'm one of the boys!" This time the big difference was that I didn't go out of my way to be with them. If I was with them, fine. I didn't search them out. I didn't look for them.

Doctor: Do you know why?

Patient: Well, because for one thing I understood my feelings.

Doctor: But specifically, why?

Patient: *I didn't have to soothe my guilt.*

There are other minority groups, symbolically speaking. In the case of this patient, his relationship with his wife and children, I believe, improved as a result of the resolution of the unconscious forces of hostility toward minorities.

The Transference-Countertransference as Part of a Transactional Process

Grinker (6) discusses in detail integration of the individualized whole organism in terms of field theory. The functioning of the organism cannot be understood except by a study of its transactional process as occurring in a total field. A frame of reference in which the organismic-environmental gestalt can be subjectively perceived is not within the activity of the psychotherapist under usual conditions. The psychotherapist is just as much a part of the system in process with the environment as is the patient. Transactional relationships develop not only with the patient, but also with the psychotherapist who is part of the environmental whole. For example, he interacts during the interview with the attitudes of his own social and professional group.

Cantril, Ames, Hastorf, and Ittelson (7) stress the transactional point of view in psychological research. Spiegel (8) states, "If the concept of the field is to be employed as the basis for representing the interconnections between the various aspects of human behavior, then all these aspects just occupy nonhierarchical positions within the field."

The Need for Scientific Data in Psychodynamics

It is a necessary condition for the study of the psychodynamic features in a transactional process that the verbalizations of the participants comprise part of the raw data to be studied. Verbalizations of the type of communication presented here are limited by their descriptive nature. This very limitation, although lacking the ideal and almost infinite complexity of the necessary features (for a more complete study) outlined, for example, by Kubie (9), provides a definite system for evaluation. This system can usually be made pertinent to a realistic goal. We can only hope to achieve our purpose by restricting our operations and by lifting the restrictions only as the meaning of the limitations originally imposed becomes clear. The verbalizations of a verbatim recording are not weighted by condensations and distortions and are available for interpretation and analysis by investigators outside the framework of the interview itself. It has been said by some that a verbatim recording is "incomplete" and that "all of the conscious and unconscious activity of the analyst as well as of the patient would be required for a truly scientific procedure." This attitude is, of course, a particularly

destructive type of scientific nihilism and does not apply to investigations at any level, even the most purely scientific. It is even maintained that notes taken during the psychotherapeutic procedure will influence the course of the analysis. From an operational point of view this, of course, is correct. Certainly, with some patients, note-taking would interfere; with others it may enhance the progress of the analysis. The same is true of verbatim recordings; but it is hard to visualize how scientific psychodynamics can be built only on recollections of the observer. To ascertain what a physician means by the term transference or countertransference it is necessary to know not only what he says about it, but what he does with it. That is, how does he function in the transference-countertransference system? It is difficult to understand how the basic process of scientific procedure has been neglected so long in one of the most important aspects of man's study of man. Certainly, if a sufficient number of analyses had been recorded, published, and studied by the usual scientific procedures and found wanting in their contribution to psychodynamics, then the value of verbatim recordings could reasonably be denied under the conditions that they were studied. At present the tragic paucity of suitable raw data in psychodynamics makes it urgent that means be found to publish verbatim data so that multi-disciplined studies of psychodynamic theory may be made possible. Too often, spectacular coincidences and anecdotes which confirm a given psychodynamic theory take the place of the basic process occurring in the transference-countertransference segment of the transaction between patient and therapist. The anecdotal procedure must give way to content analyses with emphasis on the transactional nature of the psychotherapeutic process. Only in this way can the basic framework of psychodynamics be ultimately formulated, undistorted by unknown accidental factors.

The Countertransference in Verbatim Recordings

From the point of view of the writer the science of psychodynamics cannot be adequately developed and the data cannot be suitably evaluated without verbatim recordings on a much larger scale than that presently available. It was significant that this need was stressed recently by Gill, Newman, and Redlich (10). They point out some of the difficulties encountered with respect to the therapist's attitude. When I first used the technique of verbatim recordings about 10 years ago, it was surprising to find that many supported Glover's view (11), that even taking notes in the presence of the patient was detrimental to the therapeutic process. The microphone, according to this notion, would be much more detrimental. This point of view may hold for some patients, particularly paranoid personalities. While the transference may be impaired by recordings, it is most important that the physician's attitude toward recordings be considered in terms of the countertransference. Little data on this subject are available at present.

One cannot deny that a very important part of psychotherapy is the interaction between therapist and patient. *The motivations of the therapist, therefore, are of great significance.* A study of these motivations can no longer be neglected. The therapist is constantly confronted by his own defects when listening to the recordings or when he reads the transcripts. He is, therefore, confronted with unresolved problems of the countertransference, which may be threatening to him and anxiety producing. Both patient and therapist are on the same tape recording. The therapist becomes a patient, so to speak, when the countertransference is the subject of scrutiny. He, himself, becomes a patient not only in his own eyes, but also in the eyes of the outside observers, to whom exposure of the therapist-patient relationship may be disclosed. Further, if we consider Lewin's (12) views of the dynamics of the countertransference, of the hostility and even death wishes toward the patient, problems connected with verbatim recordings may become intolerable to the therapist. Indeed, the possibility exists that this hostility may be turned onto the therapist himself. The psychodynamics of this process may account for what I believe to be the scientifically unreasonable positions taken by others. With changing ideas and availability of recording equipment, I hope that the analysis of the patient-doctor interaction will become a more integrated part of the psychotherapeutic relationship.

SUMMARY

1. Fractions of a three-hour verbatim recording of a patient under the influence of LSD are presented to illustrate its use in connection with the transference-countertransference process in therapy.

2. The technique of conducting psychiatric interviews with patients under the influence of LSD is outline.

3. On the basis of the foregoing data, it is believed that LSD intensifies the relationship with the physician during the state produced by LSD. The transference-countertransference process is brought out in bold relief against the analysis as a whole.

4. The nature of the transference-countertransference as part of a transactional process is discussed, and the need for verbatim recordings is emphasized.

BIBLIOGRAPHY

1. Abrahamson, H. A.: Lysergic acid diethylamide (LSD-25). III. As an adjunct to psychotherapy with elimination of fear of homosexuality. *J. Psychol., 39:* 127, 1955.
2. Abramson, H. A.: Lysergic acid diethylamide (LSD-25). XIX. As an adjunct to brief psychotherapy, with special reference to ego enhancement. *J. Psychol., 41:* 199, 1956.
3. Abramson, H. A.: Psychodynamic pharmacology of the treatment of asthma. *J. A. M. A., 150:* 569, 1952.
4. Abramson, H. A., Jarvik, M. E., Gorin, M. H., and Hirsch, M. W.: Lysergic acid diethylamide (LSD-25). XVII. Tolerance development and its relationship to a theory of psychosis. *J. Psychol., 41:* 81, 1956.
5. Levine, A., Abramson, H. A., Kaufman, M. R., Markham, S., and Kornetsky, C.: Lysergic acid diethylamide (LSD-25). XIV. Effect on personality as observed in psychological tests. *J. Psychol., 40:* 351, 1955.
6. Grinker, R. R.: *Psychosomatic Research.* New York: W. W. Norton & Company, 1953.
7. Cantril, H., Ames, A., Jr., Hastorf, A. H., and Ittelson, W. H.: Psychology and scientific research. *Science, 110:* 461–464, 491–497 and 517, 1949.
8. Spiegel, J. P.: Quoted by Grinker R. R. loc. cit.
9. Kubie, L. S.: *Psychoanalysis as Science.* (Problems and Techniques of Psychoanalytic Validation and Progress.) Ed. E. Pumpian-Mindlin, Stanford, California: Stanford University Press, 1956.
10. Gill, M., Newman, R., and Redlich, F. C.: *The Initial Interview in Psychiatric Practice.* New York: International Universities Press, Inc. 1954.
11. Glover, E.: *Technique of Psychoanalysis.* New York: International Universities Press, Inc., 1955.
12. Lewin, B. D.: Countertransference in the technique of medical practice. *Psychosom. Med., 8:* 195, 1946.

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SUMMARY OF DISCUSSION

The papers were discussed by the panel and following members of the audience:

Dr. Silvano Arieti
Dr. Hassin Azima
Dr. Frank Freemont-Smith
Dr. Frieda Fromm-Reichmann
Dr. Warren C. Johnson
Dr. Alexander H. Milne
Dr. Martin A. Ruona
Dr. Werner A. Stoll
Dr. Esther B. Tietz

The participants, ranging from biochemists to psychoanalysts, not only paid attention to the chemical effects upon the brain and central nervous system, but also to the effects of therapy upon the therapist. The introduction pointed out that only with a multifaceted and coordinated approach through the disciplines of anatomy, physiology, biochemistry and psychology will psychic phenomena become more understandable. Mescaline and LSD produced certain changes in the central nervous system, either directly or via an intermediary metabolite. Elucidation of these biochemical mysteries may clarify our knowledge of the naturally occurring disorders.

One of the major points was the question as to whether LSD causes schizophrenia: It was argued emphatically that no one had made such an assertion, and the final consensus was that LSD produces symptoms that are schizophrenic-like. As is the usual procedure in uninhibited discussion, it went far afield. Although the discussion primarily concerned LSD, mescaline was also considered. Its effects are not strictly comparable with those of LSD.

In the argument about toxic psychoses and schizophrenia, one difficulty was found in the effort to compare chronic schizophrenia with the temporary effects of the drugs that produce schizophrenic-like symptoms. While similarities of the effects of mescaline and LSD

and exogenous psychoses were discussed, emphasis was placed on the differences. With these particular drugs, there was no clouding of consciousness nor disorientation—the most common findings in the exogenous psychosis. There was general agreement as to the schizophrenic-like symptoms occurring in these experiments. It is understood that these drugs produce symptoms or syndromes which are also found in the schizophrenic personality, but they do not produce the total schizophrenic personality changes.

Further thoughts about the correlation between pharmacologically induced schizophrenic-like symptoms and psychopathological manifestations of schizophrenic personalities led to the following: Suppose we should succeed in the course of further experimentation in producing pharmacologically the total psychopathological picture of the illness called schizophrenia. Such developments would certainly not interfere with the necessity of investigating and understanding the psychodynamics of the schizophrenic process. One approach does not exclude the other. While we approach schizophrenia from a functional, operational, psychodynamic standpoint, we also know that the psychopathological process has its somatic correlations. Perhaps further experiments with LSD will help us correlate the biochemistry and psychodynamics of the schizophrenic process.

The psychodynamic, psychogenic processes which lead to a schizophrenic regression are accompanied by dysfunction of the mental apparatus, the highest appear in phylogeny and the last appear in ontogeny. Abnormalities of these processes in their turn produce a dysfunction of some mechanisms of the autonomic nervous system as well.

The isolation experiments being carried out at McGill University had striking similarities with the experiences reported as the result of the administration of LSD, particularly with regard to the hallucinations and states of depersonalization. Two of the isolation patients, obsessional neurotics, became definite schizophrenics and had to receive electroshock treatment before they more or less recovered. It is possible that the psychoses produced by these two methods are different. In isolation experiments the perceptual feeling is altered through decrease in external mechanisms.

Observations about LSD and mescaline have been integrated into working hypotheses such as:

1. Isotope studies in animals on the distribution of LSD and mescaline with injected C^{14} labelled compounds have shown that the lowest concentration was found in the brain, the highest in the liver and intestines. Bloch reported that appreciable amounts of mescaline could not be detected in the animal brain at a time when presumably it should be there in relation to the time mental alterations occurred in humans. He provided chemical evidence that it was transformed in the liver into a new protein-bound compound. On the evidence of the time interval it takes to form the new compound, and the relationship of this interval to the production of mental symptoms in humans, it was assumed that this new compound causes the mental effect attributed to mescaline.

2. Physiological effects of LSD are similar to physiological effects brought about by oxidation metabolites of adrenalin. This led to the assumption that LSD may act by interference with the enzymatic metabolism of adrenalin.

3. Observations have been published which demonstrate that LSD antagonizes some physiological effects of serotonin. Since there is a plausible reason to consider serotonin in the brain essential for the maintenance of normal mental functions, Woolley and Shaw suggested that the mental effects which follow LSD administration are the result of the interference of LSD with brain serotonin.

4. Marrazzi *et al.* offered evidence that, in animals (cats), LSD and mescaline cause inhibition at the synaptic level in the brain. These observations led them to speculate that mental phenomena (e.g., hallucinations) are stimulatory phenomena, for "synaptic inhibition could readily result in release from normal restraining influences with consequent stimulation." In every instance, there were concrete observations: factual findings. They demonstrated that both LSD and mescaline set forces into motion which, in turn, led to the clinical symptomatology.

The physiological and biochemical alterations resulting from psychodynamic situations are still being carefully investigated by clinical, biochemical and other methods.

SKIN HISTAMINE TEST IN SCHIZOPHRENIA[1]

T. E. WECKOWICZ, M.B., Ch.B., D.P.M.,[2] AND R. HALL, P.N.[3]

Histamine is pharmacodynamically very active. Dale's (1) investigations have shown that it exists in animal tissues in a bound form from which it is released on application of a noxious stimulus. It produces a local dilatation of the capillaries and wheal formation, followed by a local erythema, caused by dilatation of the arterioles—the so-called Lewis's triple reaction. This reaction can be produced very easily by putting a drop of histamine on the skin and puncturing the skin with a needle. It has been described by Lewis (11) and Starr (22, 23) and has been used as a test of blood circulation in peripheral vascular diseases, and also in leprosy. In this test a delay in wheal formation is indication of an impairment in blood supply.

Several attempts have been made to use histamine as a therapeutic weapon in treatment of schizophrenia (4, 5, 6, 7, 8, 14, 15, 17, 18, 19, 20, 21). The results have not been encouraging and, at the best, inconclusive, but some of the workers noticed that schizophrenics have a very high tolerance for histamine (18).

Lucy (12) has investigated tolerance to histamine in chronic schizophrenics. He followed Sackler's technique aiming at lowering of systolic blood pressure to 60 mm. Hg by subcutaneous injection of histamine. Forty chronic schizophrenic patients and ten non-schizophrenic chronic patients were used. He found that schizophrenics required much greater amount of histamine to produce the aimed at fall in the blood pressure than non-schizophrenic patients. Some of the schizophrenic patients tolerated more than 20 mg. of histamine with no side effects. This enormous tolerance for histamine was the highest in the schizophrenics who had been hospitalized for more than 20 years, thus suggesting that schizophrenic process shows little decline after the lapse of many years and that the majority of chronic schizophrenics suffer from an active illness rather than a "secondary dementia".

Peteran (16) reported that abnormal percutaneous histamine reactions were more frequent in schizophrenics than in normal people although they often occurred in other psychoses as well.

This paper reports the results of investigation of histamine skin reaction in groups: schizophrenics, non-schizophrenics and normals.

Technique

1:1000 solution of histamine base was used (2.75 mg. of Histamine Diphosphate per/cc. of water, manufactured by Abbot Laboratories, Ltd.). After many trials and errors, the following technique was developed:

The subject sat in a chair with his right arm resting on a table so that it was almost in a horizontal position. A standard, strong electric light was used in most of the cases. After the skin was cleaned with spirit and dried, a drop of histamine of about 3 mm. in diameter was placed by means of a 2 cc. standard syringe with a "24" gauge needle on the external aspect of the arm (more or less the spot of the skin which is used for vaccination).

The skin under the drop was punctured with an ordinary vaccination needle (supplied by Connaught Laboratories). The puncture was performed with one stabbing movement (it was not a scratch). While performing this puncture, it was possible to feel the resistance of the cuticle, which suddenly gave way, and so it was possible to gauge the depth of the penetration into the skin. From the moment of the puncture, the time was measured by a stop watch. At the end of the first minute, the histamine drop was wiped away with cotton wool and the skin examined for the appearance of a wheal. If there was a wheal, it was measured in its longitudinal diameter (along the axis of the arm). At the end of the second, third, fourth and fifth minutes, the skin was examined again, and the wheal was again

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measured. The wheal was measured in millimeters with the accuracy to 0.5 mm.

The same part of the same transparent plastic ruler was used for measurement all the time.

Scoring

In wheal formation, one has to measure two factors: the size of the wheal and speed of its formation. It was found that the combined score of the two differentiated schizophrenics from other groups better than the measurement of each factor separately.

In order to do this, each measurement of the size of the wheal was given a weighting, which depended on the lapse of time between the puncture of the skin and the measurement. The measurement at the end of the first minute were given weighting 5; at the end of the second minute, 4; at the end of the third minute, 3; at the end of the fourth minute, 2; at the end of the fifth minute, 1.

To obtain the combined score, each measurement was multiplied by its weighting, and the obtained figures were added up.

In order to illustrate this procedure, a score of a case is reproduced in table 1.

In this case 23 is the score of the subject. From table 1, it can be seen that a heavy weighting is given to the first measurement, where there is possibility of a subjective element in deciding whether the wheal is already present. The following criteria were used in deciding whether there was a wheal:

1. Rising of the surface of the skin which could be better seen when looked at from a level position.

2. Feeling with fingers of a small papula harder than the rest of the skin and slightly standing out.

TABLE 1

Time	Size of the Wheal	Weighting	Combined Score
	mm.		
1st minute	0	5	$0 \times 5 = 0$
2nd minute	1.5	4	$1.5 \times 4 = 6$
3rd minute	2.5	3	$2.5 \times 3 = 7.5$
4th minute	3	2	$3 \times 2 = 6$
5th minute	3.5	1	$3.5 \times 1 = 3.5$
Total score.....			23

Samples

The following samples were used:

1. Forty-one chronic schizophrenics, 24 males and 9 females. Schizophrenic patients who had stayed in the hospital continually more than one year were included in this group. Their average age was 38 years (S.D. = 7 years, 9 months). Their average length of stay in the hospital was 9 years (S.D. = 5 years). The group included 4 catatonic schizophrenics, 6 paranoid schizophrenics, 7 hebephrenic schizophrenics and 21 undifferentiated schizophrenics.

2. Thirteen semi-chronic schizophrencis, 2 females and 11 males. The patients who were recently admitted, but who had previous admissions were included in this group. Their average age was 32 years (S.D. = 7 years, 4 months). Their average length of stay in the hospital (including previous admissions) was 1 year, 10 months (S.D. = 22 months). In this group there were 3 paranoid, 4 catatonic and 6 undifferentiated schizophrenics.

3. Thirty-three acute schizophrenics, 15 females and 18 males. Only the patients who were admitted to a mental hospital for the first time in their life, and who had been in the hospital less than one year were included in this group. Their average age was 28 years (S.D. = 7 years, 6 months). The average length of stay in the hospital was 1 month (S.D. = 6 weeks). There were in this group 8 paranoid, 8 catatonic, 5 hebephrenic, 1 simple and 11 undifferentiated schizophrenics.

4. Thirty-three chronic non-schizophrenic patients, 9 females and 24 males. Only chronic patients who had stayed continually more than one year in the hospital were included in this group. Their average age was 45 years (S.D. = 12 years). The average length of stay in the hospital was 14 years (S.D. = 9 years, 6 months). There were in this group 7 cases of G.P.I. (arrested), 6 epilepsy, 8 mental defectives, 1 psychopath with epilepsy, 1 Parkinsonism with psychosis, 1 post-encephalitic psychosis, 1 presenile dementia, 2 organic dementia due to head injury.

5. Thirty-three acute non-schizophrenic patients, 17 females and 16 males. Recently admitted non-schizophrenic patients were included in this sample, although many of them had had previous admissions. Their average

age was 41 years (S.D. = 12 years). The average length of their total stay in the hospital was 8 months (S.D. = 21 months). This group included 2 cyclic maniac depressives, 9 alcoholics, 11 depressives, 3 drug addicts, 2 anxiety state, 2 character neuroses, 1 hysteria, 2 mental defectives and 1 psychopathic personality.

6. Thirty-three normal controls, 12 females and 21 males. They were members of the hospital staff who volunteered to act as subjects in this experiment. Their average age was 27 years (S.D. = 7 years, 1 month).

These samples differ somewhat in age. In order to see whether there was any relation between the histamine skin response and the age of the subjects Pearson's product moment correlation between the histamine skin test scores and the age of the subjects was calculated for the group of normal controls. The correlation is $r = -0.06$ which is completely insignificant and is probably due to random variation. Therefore, we may assume that there is no relation between the age of the subjects and their score on the skin histamine test.

The results of the histamine skin test in the groups examined are tabulated in table 2.

It can be seen that the mean scores of the schizophrenic groups cluster very closely together and are much smaller than the mean scores of the other groups which also cluster together.

To test the statistical significance of this difference, analysis of variance as used (table 3).

The difference of the mean scores between the lowest scoring non-schizophrenic group (chronic non-schizophrenic patients) and the highest scoring schizophrenic group (acute schizophrenics) is very highly significant ($t = 6.3983$); therefore, all the differences of the mean scores between other schizophrenic and non-schizophrenic groups are significant (table 4).

When we consider the ranges of the scores, we find that only 8 chronic schizophrenics (20%) and 11 acute schizophrenics (33%) had scores of 21 or more, which is the lowest score of the normal group. In the non-schizophrenic patient group, only two in the acute group and three in the chronic had scores below 21. We see, therefore, that the overlap between the two groups is comparatively small.

In the schizophrenic groups, the difference of the mean scores between acute and chronic schizophrenics is significant at $0.05 > p > 0.01$, thus suggesting that either the acute schizophrenic sample was contaminated by misdiagnosed patients, or that schizophrenia is a progressive disease, and that there is a difference in the physiological reactions of acute schizophrenics and chronic, long standing schizophrenics.

On account of the significant difference in the mean score between the acute schizophrenics

TABLE 2

Group	Average Score	Range	Standard Deviation	Variance	Standard Error	"t" at 1% level	Limits of Confidence
Chronic schizophrenics (41)	16.6	7–32.5	4.8	23.04	0.76	2.704	2.07
Semi-chronic schizophrenics (13)	17.5	10–29	5.4	29.16	1.55	3.055	4.74
Acute schizophrenics (33)	19.0	12.5–26.5	4.3	18.49	0.77	2.734	2.11
Chronic non-schizophrenics (33)	26.9	14–36.5	5.6	31.36	0.99	2.734	2.71
Acute non-schizophrenics (33)	27.1	18–37	4.2	17.64	0.75	2.734	2.05
Normal controls (33)	28.4	21–45.5	5.4	29.16	0.96	2.734	2.62

TABLE 3.—Analysis of Variance of the Score of the Skin Histamine Test

Source of Variation	Sum of Squares	d.f.*	Mean Square	F. Ratio
Within sum of squares	4539.65	180	25.22	$\frac{910.60}{25.22} = 36.10$
Between sum of squares	4552.98	5	910.60	($P < 0.01\%$)
Total sum of squares	9092.63	185		

* d.f.—degrees of freedom.

TABLE 4. THE "t" TESTS OF SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS

Groups	The Difference of Means	"t"	Significance
Acute schizophrenics-Chronic non-schizophrenics	7.9	6.3983	Highly significant $p < 0.01$
Normals-Chronic non-schizophrenics	1.5	1.0719	non-significant
Acute non-schizophrenics-Chronic non-schizophrenics	0.2	—	non-significant
Normals-Acute non-schizophrenics	1.3	—	non-significant
Acute schizophrenics-Chronic schizophrenics	2.4	2.1727	$0.05 > p > 0.01$
Chronic schizophrenics-Semi-chronic schizophrenics	0.9	0.5812	non-significant
Acute schizophrenics-Semi-chronic schizophrenics	1.4	0.9668	non-significant

TABLE 5.—AVERAGE SIZES IN MM. OF WHEALS AT MINUTE INTERVALS

Groups	1 Min.	2 Min.	3 Min.	4 Min.	5 Min.
Chronic schizophrenics	0	0.46	2.00	2.74	3.30
Acute schizophrenics	0	0.62	2.35	3.03	3.42
Semi-chronic schizophrenics	0	0.58	2.04	2.92	3.35
Chronic non-schizophrenics	0	1.48	3.06	3.74	4.15
Acute non-schizophrenics	0	1.53	3.11	3.73	4.15
Normal controls	0.19	1.68	3.06	3.74	4.26

TABLE 6.—AVERAGE INCREMENTS IN MM. IN THE SIZES OF THE WHEALS AT MINUTE INTERVALS

Groups	0–1 Min.	1–2 Min.	2–3 Min.	3–4 Min.	4–5 Min.
Chronic schizophrenics	0	0.46	1.54	0.74	0.56
Acute schizophrenics	0	0.62	1.73	0.68	0.39
Semi-chronic schizophrenics	0	0.58	1.46	0.88	0.43
Chronic non-schizophrenics	0	1.48	1.58	0.68	0.41
Acute non-schizophrenics	0	1.53	1.58	0.62	0.42
Normal controls	0.19	1.49	1.38	0.68	0.52

and the chronic schizophrenics with the semi-chronic schizophrenics falling in between, an attempt was made to find whether there is a significant relation between the histamine skin reaction and the duration of the schizophrenic illness.

The chronic schizophrenics were divided into 4 groups according to the duration of their illness: There were 12 patients with a history of illness of between 1–5 years, their average score on the skin histamine test was 15.8; 14 patients with a history of illness between 6–10 years, their mean score was 15.7; 21 patients with a history of illness between 11–15 years, their mean score was 17.7; and there were 3 patients with histories of illness longer than 15 years, their mean score was 19.5. Analysis of variance was carried out, which showed that these differences are insignificant, and that they are probably random variations.

In order to find out what the differences are in the histamine skin reaction of the schizophrenic and non-schizophrenic groups in relation to time, the average sizes of wheals at different time intervals in minutes (table 5), and also average increments in size for each minute (table 6), were calculated.

The data from these tables are represented by the graphs (figs. 1, 2).

It can be seen that the shapes of the curves of the schizophrenic groups are almost identical with each other, and also the shapes of the curves of the non-schizophrenic groups are almost identical with each other. The most striking are the sharp peak of the average increment curve in the schizophrenic groups and the top plateau in the same curve in the non-schizophrenic groups. It seems that the crucial difference is in the increment in the size of the wheal between the first and second minute. This increment is about three times as great in the non-schizophrenic groups as in

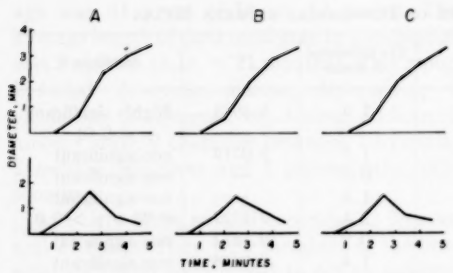

FIG. 1. The schizophrenic groups—the average sizes of the wheals and their increments. (The ordinates are the sizes in millimeters and the abscissas are the times in minutes.)

A. *Acute schizophrenics*
Above: The average sizes of the wheals at each minute interval.
Below: The average increments of the sizes for each minute.
B. *Semi-chronic schizophrenics*
Above: The average sizes of the wheals at each minute interval.
Below: The average increments of the sizes for each minute.
C. *Chronic schizophrenics*
Above: The average sizes of the wheals at each minute interval.
Below: The average increments of the sizes for each minute.

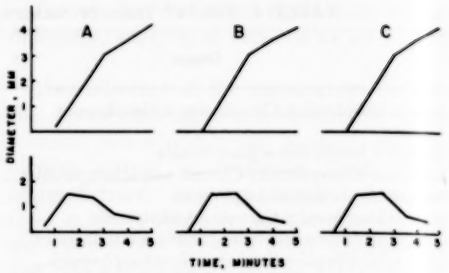

FIG. 2. The non-schizophrenic groups—the average sizes of the wheals and their increments. (The ordinates are the sizes in millimeters and the abscissas are the times in minutes.)

A. *Normals*
Above: The average sizes of the wheals at each minute interval.
Below: The average increments of the sizes for each minute.
B. *Acute non-schizophrenic patients*
Above: The average sizes of the wheals at each minute interval.
Below: The average increments of the sizes for each minute.
C. *Chronic non-schizophrenic patients*
Above: The average sizes of the wheals at each minute interval.
Below: The average increments of the sizes for each minute.

the schizophrenic groups. Other increments are not significantly different.

In the schizophrenic groups, the highest increment is between the second and third minute, while in the non-schizophrenics, there are two highest increments which are more or less equal—the increment between the first and second minute and the increment between the second and third minute.

In order to ascertain whether this difference between schizophrenics and non-schizophrenics in the histamine skin reaction is specific to histamine, or whether it was due to the diminished non-specific physiological reactivity of schizophrenics, a control study was carried out.

Fifteen chronic schizophrenics who scored low on the skin histamine test and 15 non-schizophrenics who scored high on the skin histamine test were given intradermally 0.1 cc. of two water solutions of morphia. Two strengths were used—1% and 0.01%. After the skin of the shoulders was cleaned with spirit, 0.1 cc. of 1% morphia solution was injected intradermally by a tuberculine syringe and intradermal needle in the lower scapular region of the left side and 0.1 cc. of 0.01% morphia solution in the same region of the right side. Two wheals were formed.

The transverse diameters of these wheals were measured every 30 seconds for 10 minutes. The largest measurements were recorded. For the 1% solution, the average size in the non-schizophrenic group was 18.8 mm.; the average size in the schizophrenic group was 17.9 mm. The significance of the difference between these average sizes was tested by the "t" test with "t" = 0.1242 (insignificant). For the 0.01% morphia solution, the average size in the non-schizophrenic group was 12.6 mm.; and in the schizophrenic group, 13.6. The difference between these two means is non-significant (t = 0.1860).

Thus, it appears that the difference in the histamine skin reaction of schizophrenics and non-schizophrenics is quite specific and due to the chemical properties of histamine.

DISCUSSION

A striking difference has been found between the histamine skin reaction in schizophrenics and non-schizophrenics. The main criticism

which can be directed against this study is the marked subjective factor in ascertaining the presence of the wheal in its earliest phase. In order to find the degree of reliability of the measurements and scoring, one group (chronic non-schizophrenics) was tested by two experimenters. One tested 19 patients and the other 14 patients. The two mean scores obtained were 27.7 and 25.8. The difference when tested by "t" test was found to be insignificant ($t = 1.0215$). Also, the test was repeated after one-week interval on a group of 10 patients (7 schizophrenics and 3 non-schizophrenics). Spearman's rank-difference correlation coefficient was calculated; rho = 0.79 ($p < 0.01$). It seems, therefore, that the measurements are reliable although the reliability of the test will have to be established by blind testing, and repetition of tests by two independent experimenters on the same patients.

When one inquires into the meaning of these findings, one can think of three possibilities:

The first possible explanation is that this diminished skin reaction in schizophrenics is non-specific.

It has frequently been shown that schizophrenics can tolerate abnormally high doses of drugs and hormones such as thyroxin, insulin and atropine. Fischer (3) has suggested that this diminished response to certain drugs and hormones is due to the fact that schizophrenics are in the resistant phase of the general adaptation syndrome. Hoskins (10) has suggested that schizophrenics show diminished physiological response to all stress situations. In this study, it has been found that while the skin response to histamine is markedly diminished in schizophrenics in comparison with non-schizophrenics, the skin response to morphia is the same in both groups. It seems that the reaction to histamine in schizophrenics is specific although to establish this will require further investigation.

The second possibility is that this diminished skin reaction to histamine is due to the fact that there are differences in the capillaries of schizophrenics when compared with non-schizophrenics.

Lovett Doust (13) has found morphological differences between the capillaries of schizophrenics and non-schizophrenics. It is known that dilatation of capillaries plays an important role in wheal formation, and, therefore, this possibility requires investigation.

The third possibility to account for this diminished skin reaction in schizophrenics is the presence in the blood of schizophrenics of a substance which possesses anti-histaminic properties.

Hoffer and Osmond (9) have suggested that schizophrenia is an autonomic nervous system disease, during the initial phase of which there is an increased parasympathetic activity, stimulating and followed by an increased sympathetic activity. There is an increased production of adrenaline with a failure to detoxify its metabolites. Quinone indoles, such as adrenolutin and adrenochrome, are suggested as possible representatives of the whole spectrum of toxic substances, which by inhibiting choline-esterase, affect the function of the nervous system and produce psychotic condition.

Fedoroff (2) has found that blood from schizophrenic patients is toxic to L-strain mouse fibroblasts, thus suggesting the presence of a toxic substance.

It is known that adrenaline and its derivatives, such as adrenochrome and adrenolutin, have anti-histaminic properties. The fact that the skin histamine reaction is mainly affected in the early phase (between the first and second minute) suggests that there is some inhibiting factor, such as a chemical substance, which acts by competing with histamine in chemical reactions until its local supply is used up and the excess of histamine produces a delayed reaction.

This explanation agrees also with the observation that allergic diseases, such as asthma, eczema and hay fever, are less frequent in schizophrenic patients than in the rest of the population.

These are very interesting possibilities. However, the relationship between the resistance to histamine and schizophrenic process is far from being a simple one. There are occasional patients who are undoubtedly schizophrenic, and yet, who have a marked skin reaction to histamine. There is probably more than one factor involved.

The only conclusion one seems to be entitled to make is that schizophrenia is a pathological entity, in which bodily metabolism of the

patients is changed. This manifests itself in a modified skin reaction to histamine. The physiological and biochemical changes responsible for this modification of the skin reaction persist in chronic patients, thus suggesting that in "chronic" schizophrenics an active disease process is present, and that it is this active process, rather than "secondary dementia" which is responsible for the condition of the patients.

Skin histamine test offers great possibilities in delineating nosological boundaries of schizophrenia, and also in investigating its natural history.

Summary

1. A skin histamine test which differentiates between schizophrenics and non-schizophrenics has been described.

2. It has been found that in comparison with non-schizophrenics, schizophrenics show delayed and weaker skin reaction to intradermal application of histamine.

3. The reaction to histamine is characteristic for schizophrenia.

4. The theoretical implications of these findings have been discussed.

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BIBLIOGRAPHY

1. Dale, H. H., and Laidlow, P. P.: Histamine and anaphylaxis. *J. Physiol., 41:* 318, 1910.
2. Fedoroff, S.: *Anat. Rec., 121:* 394, 1955.
3. Fischer, R.: Schizophrenia: A regressive process of adaptation. *J. Nerv. & Ment. Dis., 119:* 6, 1954.
4. Gildea, E. F., Himwich, H. E., Hubbard, O. E., and Farikas, J. F.: Comparative study of some of the changes produced by various types of drugs in schizophrenic patients. *Am. J. Psychiat., 91:* 1289, 1935.
5. Gunter, J.: Wirkung des Histamins bei Psychosen. *Schweiz. Arch. Neurol. u. Psychiat., 70:* 48, 1952.
6. Hill, H.: Histamine and insulin in the treatment of schizophrenia and other mental diseases. *J. Ment. Sc., 84:* 581, 1938.
7. Hill, H.: *Histamine and Insulin Treatment of Schizophrenia and Other Mental Diseases.* London: Balliere, Tindall and Cox, 1940.
8. Hoch, P.: Evaluation of histamine therapy in the psychoses. *Am. J. Psychiat., 109:* 229, 1952.
9. Hoffer, A., and Osmond, H. F.: Schizophrenia—An autonomic disease. *J. Nerv. & Ment. Dis., 122:* 448, 1955.
10. Hoskins, R. G.: *The Biology of Schizophrenia.* New York: W. W. Norton & Co., Inc., 1946.
11. Lewis, T.: *The Blood Vessels of the Human Skin and Their Response.* London: Shaw and Sons Ltd., 1927.
12. Lucy, J. D.: Histamine tolerance in schizophrenia. *Arch. Neurol. & Psychiat., 71:* 629, 1954.
13. Lovett Doust, J. W.: The capillary system in patients with psychiatric disorder. *Arch. Neurol. & Psychiat., 74:* 137, 1935.
14. Marshall, W.: Influence of histamine on behaviour in psychotic patients. *M. World, 57:* 584, 1939.
15. Marshall, W., and Tarwater, J. S.: Use of histamine phosphate and peptone solution in the treatment of neuroses. *J. Nerv. & Ment. Dis. 88:* 36, 1938.
16. Peteran, V.: Die Percutane Histaminreaktion bei Geisteskrankheiten, insbesondere bei der Schizophrenie. *Neurol. Psychiat. csl., 4:* 187, 1941.
17. Robb, R. W., Kovitz, B., and Rapaport, D.: Histamine in the therapy of psychosis: Psychiatric and objective psychological study. *Am. J. Psychiat., 97:* 601, 1940.
18. Rouleau, Y., Nadeau, G., Delage, J., Coulombe, M., and Bouchard, M.: An Appraisal of Histamine Therapy in Schizophrenics. Presented at the American Psychiatric Association Regional Meeting, Montreal, December, 1953.
19. Sackler, A. M., Sackler, M. D., Sackler, R. R., and Van Ophuijesen, J. H. W.: Nonconclusive biochemotherapy with histamine. *J. Nerv. & Ment. Dis., 110:* 149, 1949.
20. Sackler, A. M., Sackler, M. D., Sackler, R. R., and Van Ophuijesen, J. H. W.: Nonconclusive biochemotherapy with histamine and electric convulsive therapy. *J. Nerv. & Ment. Dis., 113:* 40, 1951.
21. Sackler, M. D., Sackler, R. R., Sackler, A. M., and Van Ophuijesen, J. H. W.: Technique of histamine biochemotherapy and suggestion for its use in psychiatry. *J. Nerv. & Ment. Dis., 113:* 40, 1951.
22. Starr, I., Jr.: Change in the reaction of the skin to histamine as evidence of deficient circulation in the lower extremities. *J. A. M. A., 81:* 293, 1923.
23. Starr, I., Jr.: The value of the cutaneous histamine reaction in the prognosis of pedal lesions in diabetes mellitus; after-histories of 89 patients for five years. *Am. J. M. Sc., 188:* 548, 1934.

SOME SOCIAL AND BIOLOGICAL ASPECTS OF ANXIETY

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Anxiety is a condition of human living, and in the restricted sense in which the term is used in this essay, it is almost exclusively the property of the human species. Some observers of the current scene believe that anxiety is more prevalent than ever before in the history of the race; writers have spoken of the present time as the "Age of Anxiety". It is extremely difficult to measure accurately the "amount" of anxiety, but it is at least safe to say that never before have so many been so interested in anxiety and in the possibilities of understanding and of diminishing anxiety. This interest is very general; poets, theologians, philosophers, and savants of all sorts express themselves freely on the subject.

The problem of anxiety has a special urgency in a medical context since it is to the physician that the anxious person brings his distress. Traditionally, doctors have been assigned the task of allaying anxiety, but it is only in recent times that understanding of anxiety in both its biological and social aspects has emerged. If one differentiates between the "art" of medicine and the "science" of medicine, it may be said that the control of anxiety was largely "artistic" until the progress which has been made in recent decades in understanding on a more scientific basis how the experienced physician exerts his anxiety-relieving effect.

In the course of the developments in medicine in this recent era, it has become clear that the broad field of medicine includes two quite different points of view in dealing with the problems of sick people. Any such problem may be defined as a "disease" occurring in a "host", and the problem may be approached from the side of the disease or from the side of the host. It is, of course, impossible to separate these aspects except for the purpose of discussion, but the effect of an emphasis on the one or the other side may be very great.

The study of "disease" is the province of the pathologist; the great flowering of interest in the disease process began with Virchow and cellular pathology. This general approach has culminated in almost unbelievable advances in the control of many of the formerly common ailments of mankind. The spectacular advances in pathology, medicine, surgery, and pharmacology have pointed up by contrast the problem of those illnesses which are not susceptible to investigation by these techniques. A growing change of emphasis has focused increasing attention upon the "host" aspect of the problem of illness, and more and more comments are to be found which point to the importance of the general problem of "host resistance". This changing emphasis has gone along with a great development in psychiatry, and increasing attention is now being paid to the manner in which the whole state of the human being, including prominently his emotional life, affects his reaction to various stressful events.

It is unfortunate but perhaps inevitable that there should be conflict between these two points of view; the "disease-oriented" physician and his "person-oriented" fellow commonly encounter difficulties in agreeing. This communication has as its principal goal a discussion of anxiety which traces the development of modern ideas of anxiety from the formulations of both psychological and biological investigation. Anxiety is important to understand from both points of view: while it may appear to the outside observer that anxiety is a reaction of the "host", at least to the unfortunate sufferer it appears as a most unpleasant "disease".

Definition

The physiological state basic to anxiety may be generally observed in mammals, but anxiety in its clinical form is limited to human beings. In animals the state is a generalized condition of wariness or vigilance, and the most prominent manifestations are the result of activity in the thoraco-lumbar division of the autonomic nervous system.

This physiological state in animals was extensively investigated by Cannon (3). He

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found that the activity of the sympathetic nervous system improves the state of readiness in the animal by lessening muscular fatigue, increasing cardiac output, increasing the general muscular tone, and so forth. Vigilance in some ways is analogous to the "warming up" process in which an athlete prepares himself for entering the game; mild anxiety tends to lead to a better performance than a state of complete calm. The characteristic manifestations include a rapid pulse, tremulousness of the extremities, sweatiness of the palms and axillae, widening of the pupils and of the palpebral fissures, a generalized heightened tension in the muscular apparatus, and so on. This state can be artificially induced either by stimulation of the thoraco-lumbar division of the autonomic nervous system or by the injection of epinephrine in appropriate dosage.

The difference between the physiological condition of sympathetic activity and the psychological state of anxiety is the difference between a set of data and a conclusion. With reference to experimental animals, the conclusion reached by Cannon after a large number of ingenious studies was that this state of sympathetic mobilization had the purpose of preparing the organism for violent activity, for "fight or flight". In man the psychological condition of anxiety represents the awareness of widespread mobilization of sympathetic activity within oneself, along with an interpretation that this mobilization has some purpose or goal. A distinction between the states of fear and anxiety has been made on the basis that in fear the purpose is clarified by a conscious awareness of the goal, whereas in anxiety the threat is unknown. It is apparent that this distinction cannot be an absolute one, but it is of considerable importance. For example, many states of anxiety can be relieved by an understanding of the threat. Indeed, the occurrence of phobias demonstrates this convincingly since in the establishment of a phobia a concrete fear is substituted for a diffuse anxiety, and the avoidance of the feared object allows the phobic patient to feel comfortable.

As a theoretical tool, anxiety in another sense has come to occupy a central place in modern psychiatry: behavior is explained as designed to reduce anxiety. Many of the commonly observed behavioral patterns of human beings are understood as repetitive attempts to avert anxiety or to defend oneself from the occurrence of this disagreeable state. Modern notions of anxiety formulate the state in a teleological setting: it points to the future and has the purpose of preventing catastrophe. In general the catastrophe is understood as a severe disturbance of the relationship involving the organism and the environment. This relationship has to remain constant within certain limits if the organism is to survive and reproduce, and the emergency devices of the organism have the purpose of making this possible. It has been one of the important achievements of modern psychiatry to extend this general scheme to embrace developments at a psychological level; where the physiological defenses of the body are oriented to the maintenance of a steady state at the organism-environment level, the psychological defenses are oriented toward the maintenance of a steady state in the system of human relationships of which any given individual is the nodal point.

Historical Review

A conceptual scheme dealing with the general problem of maladaptation has grown up in the latter part of the nineteenth and the first half of the twentieth century, founded upon the work of investigators in many fields. The names of Bernard (2), Cannon (3), Sherrington (11), Pavlov (9), Freud (5, 6) and Selye (10) appear in very different contexts as key contributors. Through the work of all of these, there runs a general notion of life as process in a temporal framework. In a variety of ways these men have pointed out that "organism" cannot be absolutely differentiated from "environment"; rather, organism and environment are aspects of a system. The understanding of processes in this system is the goal of the study of living beings. Evolution in this view can be regarded as the history of a progressively more inclusive systematization involving "organismic" and "environmental" aspects. In this process specialization leads to the molding of the organism to anticipate aspects of the environment. Various mutative changes occur in the organism, to be "chosen" or "rejected" in the course of the natural experiment of adaptation to the environment, and the resultant total modification forms a

sort of condensed history of the successful mutations. These "histories" occur as temporary developments in ontogeny, in structural forms as adapted organs, or in dynamic potentialities such as the conditioned reflexes to which we shall return below.

The idea which unifies many contributions to this field is that of an on-going process out of which structures and entities emerge. The forms appearing in evolutionary development are those which allow the process to perpetuate itself both in one individual and in the reproductive series. An early statement of the notion is to be found in the internal environment of Bernard; and a much more sophisticated and general statement is the idea of transaction developed by Dewey and Bentley (4). It is a commentary upon the usefulness of this idea that various contributions can be related to each other without strict reference to the time sequence in which the ideas emerged. Each of these contributions has an independent existence of its own and at the same time forms an integral part of a great general scheme. Upon the biological basic scheme there is superimposed a discussion of the special problems of human beings. In briefest outline the scheme can be displayed, with a subsequent addition of greater detail.

The development begins with Claude Bernard's idea of an *internal environment* (the "milieu interne"), a fluid buffer participating in both organismic and environmental events. Taking up this idea and developing it at a somewhat more abstract level, Cannon investigated the various methods by means of which a *steady state* was maintained in the buffer, especially the various emergency devices by means of which disruption in the steady state were predicted and averted. In his discussion of the problem, Cannon emphasized the autonomic, "interofective" mechanisms by means of which dangers to the steady state were automatically predicted and guarded against. The work of Sherrington, at a somewhat earlier date, complements that of Cannon; Sherrington was concerned primarily with the sensory "exteroceptive" components of the nervous system. These elements, in combination with the voluntary muscular system, form a second great system for the prediction and anticipatory control of future dangers threatening the steady state of adaptation. In a metaphorical phrase, Sherrington spoke of the "distance receptors" of the higher animals as surrounding the head end of the animal with a "shell of the future". The more recent work of Selye has specifically addressed itself to "stress" as a general term covering all types of threats to the steady state; his work has demonstrated that the organization of the endocrine systems of the body is a predictive one. The *General Adaptation Syndrome* of Selye describes the complex system by means of which preventive and reparative processes occur primarily through humoral communicating agents.

Sherrington looked primarily at the special senses and their neural connections with the voluntary musculature; Cannon primarily at the autonomic nervous system in which both neuronal and humoral elements are combined; and Selye has described the organization of the endocrine glands bound together primarily by humoral agents transmitted by the bloodstream.

In the work of these men, the problems investigated are those which are common to man and to the remainder of the mammals. To understand anxiety in its clinical manifestations, however, the scheme must be extended to embrace the special problems of human beings. These problems all appear to come from the fact that man has developed, through evolutionary change, a higher level of organization for the purpose of protecting himself. This new level or organization is the social one: man lives not only in a "natural environment" but also in a "social environment", a culture or social system. In a manner analogous to that in which the "internal environment" is interposed between the naked cell and the hostile environment, in man the "social internal environment" serves the function of interposition between any individual and his group. This system is often referred to as the "psychic reality" of a person, and it is to disturbances here that anxiety is to be traced.

The link between the animal world and the natural environment, on the one hand, and the human world with its social environment, on the other, is to be found in the work of Pavlov. He demonstrated the manner in which animals could be trained to put together long series of stimuli and responses into a system; these

extended series of expectations he called "conditioned" or "conditional" reflexes. In a conditioned reflex, the animal when confronted with the first of a series of events demonstrates a physiological preparation for a distant event in the series.

In the course of his investigations Pavlov further discovered that under certain conditions of distress, the animals trained to the conditioned reflex experiments broke down into states of "anxiety" which bore important resemblances to conditions otherwise limited to human beings. These "experimental neuroses" have since been extensively investigated by Liddell (8) and Gantt (7) in this country. These investigations have demonstrated that under appropriate conditions of prolonged restraint with the exhibition of contradictory conditioned signals, a state could be induced in animals which has striking resemblances to clinical neuroses in man. The manifestations of protracted anxiety in animals of this type are especially interesting in the present context.

In reviewing the whole development in somewhat greater detail, it is of interest to follow the shifts in point of view which occur in the various investigations. Bernard's idea of an internal environment is a rather static one; the fluid buffer like the shell of the crustacean surrounds the naked cell and protects it from the hostile environment. Cannon's development put the basic idea in a more dynamic framework. He noted that it was the steady state of relationship between environment and organism which was most important to preserve. The steady state puts the emphasis upon a *process* occurring in time, replacing an idea of a fluid bath spatially interposed between cell and environment His investigations emphasized preparatory and predictive functions: through the mediation of the thoraco-lumbar division of the autonomic nervous system and its associated glandular devices, animals have developed great potentialities of preparing for coming emergencies. In the case of wild animals the principal dangers demand either "flight or fight"; epinephrine and sympathetic nervous system stimulation prepare the organism for violent muscular activity of this sort, through mobilization of blood sugar, increase in heart rate, in blood pressure and in cardiac output, and the effect of epinephrine in decreasing fatigue in muscle.

Sherrington's work complements that of Cannon. Sherrington was primarily interested in the integrative action of the nervous system by means of which sensory and motor components of action were connected with each other in a purposive way. Much of his work was concerned with what would now be called "feed-back" sensorimotor mechanisms by means of which the organism adapts itself to varying conditions. In summing up his work, he points out how integration via the sensorimotor system enables the animal to live in expectation of future events. In his differentiation between the exteroceptive and the proprioceptive components of the central nervous system he emphasized the temporal distinction between their functions. The exteroceptors, the "distance receptors", collect information about future dangers to be avoided and gratifications to be sought, while the proprioceptors provide a continuous source of information about the immediately current state of affairs in the organism's muscular and skeletal systems.

If we compare the work of Sherrington and of Cannon, it will be clear that the two dichotomies with which these two investigators worked are closely related to each other. The significant distinction in each case is between preparation for future emergencies and the appropriate handling of the current situation. Sherrington made this distinction by talking about "anticipatory" and "consummatory" reactions, and he pointed out that in the central nervous system these were primarily related respectively to the distance receptors and to the proprioceptors. Cannon's distinction between the thoraco-lumbar and the cranio-sacral division to the autonomic nervous system deals with the same sort of temporal division, differentiating between the anticipatory reactions of the sympathetic side and consummatory reactions of the parasympathetic side.

It needs perhaps to be emphasized that these dichotomies are analytic devices significant primarily for purposes of discussion, and that in fact the glory of the animal organism is the integration of the nervous and glandular systems dealing both with the present and with the future. Much of the problem of anxiety

in human beings can be traced to a disturbance in this integration; in anxiety the preoccupation with a dreadful future interferes with the management of the immediate problem. In this connection another distinction pointed out both by Cannon and Sherrington is of great significance. This distinction is one made between part-reactions and whole-reactions. Sherrington points out that the distance-receptors control the musculature of the whole body. The potentiality of the total reaction is most completely observable in emergency situations in which the animal may be completely immobile in an intense attitude of listening or looking; we say that the animal "freezes in his tracks". In man the same sort of immobilization can be induced in emergency situations by means of the general commands, "Hark!", "Lo!", or "Listen!"—the railroad slogan, "Stop, Look, and Listen!" is a combination of all these. Cannon points out with reference to his special interests that the thoraco-lumbar system of the autonomic nervous system has a similarly diffuse area of influence: the wide distribution of sympathetic nerves and the diffuse influence of the humoral agents associated with the thoraco-lumbar division affect the body from head to toe.

On the other hand, Sherrington points out how the consummatory reactions affect only one system at a time; an animal feeds or excretes or copulates to the exclusion of other activity. In some animal species this absorption reaches extreme degrees, as in the case of the frog which continues its copulatory activity even after having been cut in two at the middle. Cannon in turn has pointed to the separate functions of the various subdivisions in the parasympathetic (cranio-sacral) division of the autonomic system.

The balance between these two systems is of interest since, in general, the whole reactions and the distance receptors take precedence in cases of emergency; for the most part a situation in which the sympathetic nervous activity is high inhibits parasympathetically innervated consummatory reactions. Anorexia, constipation, and loss of sexual desire, for instance, not infrequently accompany states of anxiety. On the other hand, in situations in which the consummatory tendency is extremely intense, the actions motivated by these impulses may go on in the face of the most extreme danger: the starving man is willing to take almost any chance to get food, and so on. Under different conditions almost any conceivable combination of activity in the two systems can be found in clinical states of illness.[2]

The work of Pavlov takes a sharply different tack from the work of these men in that Pavlov studied the manner in which animals learned to adapt themselves to artificial situations. Since artificial situations vary to a much greater degree than does the natural environment, the problem becomes a much more individual one. For example, the development of lungs can be though of as a modification which confidently predicts that the species can be expected to be born into an atmosphere; this prediction is so automatic that it is only for special purposes that it is seen as a prediction. On the other hand, the animal in the conditioned reflex situation can be trained to respond predictively to an immense variety of stimuli, such as bell tones, geometrical figures, metronomes at various speeds, and so on. The general scheme remains the same, however, since the conditioned reflex represents an expectation of environmental events built into the behavioral structure of the organism. The vast increase in uncertainty made possible by this artificial situation is the occasion for the development of an anxiety very like that of human beings. The confused animal confronted with contradictory directions is not unlike the human being who asks anxiously, "What shall I do?"

The understanding of the specificially human problems of adaptation may be attributed in large part to Freud. In his work the same general scheme may be found although it is much obscured by an unfortunately metaphorical terminology. Freud pointed out how significantly neurotic symptoms may be traced to the training of a child in his earliest years; the personality is to be understood as the resultant of biological tendencies and the

[2] Parenthetically here it may be noted that certain "psychosomatic" diseases have been traced to an imbalance between the two systems; in those instances in which the response in the sympathetic division is inadequate either by reason of suppression or of wearing out, the subsequent overactivity of the parasympathetic component may be of crucial importance in the genesis of a chronic illness.

social restraints imposed by the parents who form the social environment of the earliest years of life.

The central controlling system in human beings is one which mediates between biological and social imperatives: human beings are faced with the special problem of so altering innate biological tendencies as to integrate them with the restrictions imposed by social living. These rigid restrictions form a sort of strait-jacket, into which the human being must fit himself. This problem is even further complicated by the fact that the social restraints to which the child is exposed in the plastic period of early life may be similar to, or different from, the restraints experienced by the majority of his fellows. As a general rule when a child finds himself in a situation where the restraints are very different from those to which he is accustomed, in either direction, he feels anxious because the degree of uncertainty in the world is very much increased by either more severe restriction or more complete freedom.

The Ego, in Freud's terms, is the institution which mediates between the external world and the Id, but if we translate this terminology into that of Cannon and Sherrington, the Id is a collective term for those potentialities for consummatory reactions which form the central biological concern of the organism. The "instincts" or "drives" which make up the Id are those needs which relate to the same problems of feeding, excreting, and sexual activity. Freud's tendency to work out new names for the entities which he described and to personify these entities has tended to obscure the basic similarity in his point of view and that of Cannon and Sherrington. The idea of an Ego emergent from processes to which environment and organism are party is similar to the other transactional formulations cited. Freud says of the Ego that it is "... a coherent organization of mental processes ... (which) ... includes consciousness and ... controls the approaches to motility, e.g., to the discharge of excitations into the external world." Freud points out with embryological accuracy that the sense organs directed toward the external world, the "distance receptors" of Sherrington, are elaborated from the surface of the body. The Ego derives from "inside" and "outside" data, correlated through the activities of the sensory modalities at the surface.

It is a commentary upon the universality of trends of thought that the work of Freud and of these investigators in the biological field supplement each other to an important degree. Together the two approaches allow a fuller understanding of the way in which a physiological state comes to assume a social function in that it operates as a signal warning of approaching danger not only to the steady state at a physiological level, but also to the steady state at the level of human relatedness. The same preparatory steps which take place when the organism is threatened by a predatory animal take place also when a human being is threatened with economic catastrophe or a loss of status. This human development of the animal function depends upon the restraint of immediate action and the perception of the state of readiness; man is differentiated from animal by his ability to derive information from self-observation.

In man the signal anxiety invariably has some significant connection with the system of human relatedness which forms the most important environment. Man lives in this environment indirectly in a manner similar to that outlined above. The "social internal milieu" is the system of habits and expectations interposed between "individual" and "group", and a maintenance of a steady state in this system is essential for social existence. This system is in many ways analogous to the internal milieu of Bernard, but there is a crucial difference in that many of the most important institutions in a social system are purely matters of agreement. Goals which have a meaning only in such a system, goals such as honor, patriotism, loyalty, and the like, have in human beings superseded the goals of self-preservation, feeding, and sexual satisfaction which are prepotent in lower animals.

Anxiety in Relation to Restraint

Many lines of evidence indicate that the clinical state appearing as anxiety in man only occurs where the potentialities of movement in response to stimulation are severely curtailed. The natural impulse, as Cannon postulated, is to attack or run away from a danger when it is perceived. The mobilization of re-

sources mediated through activity in the sympathetic nervous system is maximally valuable in situations in which violent muscular activity is imminent. In human beings this state of preparedness has the quality of being unpleasant up to the point at which the indicated action is set in motion, although beyond that point the actor loses awareness of the state of anxiety as it merges into the given action. This sequence, of an unpleasant preparatory state completely disappearing as the action is begun, is one which can be introspectively verified on any occasion of the occurrence of stage fright. The general principle is that when action is called for by the situation under circumstances which restrain the individual, the state of preparedness is experienced as intensely disagreeable.

The restraint of immediate response is essential in human beings since it is only by means of such restraint that new patterns of action can be learned. A novice in a given situation must be immobilized long enough for the new pattern of stimulation and of responsiveness to become clear to him. Training of either animals or of human beings requires the suppression of previously learned or instinctive patterns of action for establishment of new patterns.

The problem in all types of training is one of the establishment of an appropriate middle course. Where the restraint is too suddenly or too forcibly applied, the resulting state of preparedness may become explosive.[3] On the other hand, in the absence of restraint new patterns of action are not learned. Not only so, but unless the restraint is applied at a point at which the animal is in a developmental stage which makes him sufficiently plastic, new patterns of learning are almost impossible to induce ("You can't teach an old dog new tricks").

The physiological basis for these phenomena is to be found in the work of Pavlov. In his research into the nature of conditioned reflexes he demonstrated the significance of restraint, and the later extensions of his work into the field of the so-called "experimental neuroses" has demonstrated many of the possibilities of the disorganization of behavior through a combination of repetitive stimulation and restraint.

In the classic Pavlovian conditional reflex experiment, a trained dog is brought into the laboratory, immobilized in a harness. In a state of hunger he is stimulated repetitively by a combination of the unconditional stimulus, that is to say, a piece of meat, and the conditional stimulus, classically a bell tone. The dog reflexly salivates in response to the unconditional stimulus, the meat, as he prepares to eat it. When the meat and the bell tone are repetitively presented together, the dog tends after a period of training to salivate reflexly to the conditional stimulus when it is presented alone. The dog can be said to be responding physiologically to the *meaning* of the bell tone in terms of his past experience.

In the restrained setting of the CR situation, when the stimuli presented to the experimental animal over a considerable period of time are too ambiguous for the animal to make satisfactory distinctions or when the signals are so arranged as to call for contradictory responses, the animal develops an "experimental neurosis", many of the manifestations of which are closely similar to those of human neuroses. It is a matter of interest that the experimental neurosis cannot be induced unless the animal's movements are greatly restricted. In some circumstances, the presence of a related animal (e.g., the mother of the kid being used as an experimental animal) prevents the development of the experimental neurosis. Both of these facts carry therapeutic implications in relation to anxiety.

Formulation of Anxiety

The feeling of anxiety is related to disturbance in the "social internal milieu", the system of expectations which forms the central concern of each of us. The relation is primarily quantitative here since any alteration of sufficient magnitude will arouse anxiety: unexpectedly "good" events evoke anxiety as well as unexpectedly "bad" ones. The various events which may grossly change the system

[3] It is presumably to the general condition of overrestraint that the sudden death of many wild animals in the state of captivity can be traced. It is parenthetically interesting that in his later years Cannon's interests turned to this phenomenon of sudden death. The explosive character of the response to restraint in a situation demanding action can be observed also in the epileptiform seizures induced in rats in subjecting them to air blasts at close range.

of expectations are myriad: the loss of a close relative, a loss of a job or a promotion, a major illness, a marked change in social position, and so on.

The biological state basic to anxiety is one of a general readiness for action. The patient is tuned up, ready to go. The difficulty in pathological instances of anxiety, however, is that this preparation is phylogenetically oriented towards an external world whereas the danger which threatens is internal. Immediate relief of anxiety is usually experienced when some active measure can be taken; an important defensive maneuver often used is that of projection in which the inside danger is attributed to some outside source. Basically the internal danger is an uncertainty on the part of the patient of his ability to cope with the problems which confront him. He is usually afraid of two different possibilities. The first of these is that he will be too weak or inadequate to cope with some feared emergency, and the second is the mirror image, in a sense, of the first: the patient fears the possibility that he will resort to anti-social means of solving the problem.

For instance, commonly in anxious patients some problem in the father-son or boss-subordinate relationship is involved. Any such relationship includes elements of both dependence and competition; the junior member wishes to become senior, but he fears giving up the protection involved in his dependent status. The most severe anxiety can be found in those persons who cling desperately to a dependent status while rebelliously asserting their independence. When the fears which underlie the anxiety become manifest in such a patient, it will be found that they go in two directions, those of being injured by, and of injuring, the related person. The fantasies of being injured include all versions of attack and illness, while the fantasies and dreams of injuring may take violent and bloody form. The general basic problem is one of anticipating a loss of control in a world which has become too uncertain to live in. Anxiety is characteristically the state which ensues when the threat is maintained over a long period of time in the presence of considerable restraint. The intensity of the anxiety is proportional in general to the intensity of the threat and to the extent of the impairment of freedom in action.

The simplest method for the relief of anxiety is the method directly borrowed from wild animals, that of flight or fight; "acting out" includes various methods of running away from a threat or of anti-social behavior designed to remove the threat. It scarcely needs to be pointed out that in a civilized society the direct methods of solution of these problems present a variety of complications. Not only does anti-social behavior frequently lead to direct punishment, but it also leads into many vicious-circle processes of guilt feelings and lowered self-esteem with a consequent diminished confidence in one's ability to handle future threats.

At the opposite end of the scale, the appropriate use of anxiety at levels of tolerable intensity leads to growth in the personality and in accumulation of reserves of adaptive potentialities. Anxiety is most productively relieved through its conversion into some sort of emotional expression. The appropriate emotion varies greatly with the situation; common ones are grief, anger, or love. The loss of a close relative threatens a whole series of habitual behavioral patterns, and for the adequate discharge of the anxiety induced by these demands a period of mourning with the establishment of new behavioral patterns is essential. The threat of opposition by a competitor also arouses anxiety and poses the demand for a different type of emotional expression, e.g., a controlled display of anger or aggressiveness in relation to the competitor. Still further, the demands imposed by the processes of sexual maturation arouse anxiety in the course of the establishment of new patterns of behavior in relation to members of the opposite sex. These problems are most effectively solved by the development of a loving relationship with an appropriate partner.

Perhaps the most important contribution of modern psychiatry to the problem of anxiety is the idea that every such state refers to some possible crisis in human relationships. The remarkable shift in emphasis in human living has made preservation of the "social internal milieu" the most important goal of human beings, and it is to alterations in this aspect of life that anxiety symptoms refer. The unknown aspect of the danger is accounted for by the fact that human beings know little about the form and function of this important system. The

social internal milieu is far more complicated than is any physiological system, and it is correspondingly more difficult to understand, requiring even a different vocabulary and a different set of general notions; it is not therefore surprising that our knowledge of it should be so late in arriving and as yet so limited in extent.

Therapeutic Implications

As Freud pointed out, the condition of anxiety refers always to a state of helplessness. The original state of maximum helplessness is that of birth; at birth helplessness is complete and the human newborn depends entirely upon some outside assistance if he is to survive. As soon as the infant has developed any sort of awareness of his dependence upon others, he will tend to demonstrate anxiety when left alone; it is important to note here that even very early in life the baby is not anxious if he *chooses* to explore alone, but only if he somehow has the feeling of helplessness in being left alone. This tendency persists through the various states of anxiety in the adult since it will be found that anxiety may be allayed either through the constant attendance of some appropriate companion or by the assumption of a condition of alone-ness on one's own initiative, as for example, in the states of isolation of the schizoid type.

The state of anxiety can be summed up in a formulation which implies a classification system of the various therapeutic measures which can be applied by either patient or physician, both consciously or unconsciously. The anxious patient has a variety of sensations which he feels helpless to manage alone; these sensations refer to some unknown danger in the future and demand urgent action, but the patient is unable to decide upon an appropriate course of action. The various therapeutic measures which can be applied refer to various aspects of this statement: The patient may be relieved 1) by being accompanied, 2) by a diminution in the intensity of the sensory experience, 3) by the development of some effective type of response, or 4) by an understanding of the threat. All of these possibilities refer to alterations in the "social internal milieu", and the beneficial agencies are manifold.

It is possible to separate these methods clearly only artificially, but it is perhaps useful to set up some sort of classification with this limitation in mind. For example, it is impossible to separate the influence of the doctor from the influence of his medicine; in Beecher's studies (1), administration of a placebo had in many instances an effect as great as that of physiologically potent drugs. Is this to be classed as the effect of a therapeutic relationship or the effect of a drug? It actually is clearly both since the drug in this instance has the magic significance of a tangible sign of the doctor's interest and superior knowledge.

With this limitation, however, it is possible to classify the methods of relieving anxiety: Methods designed 1) to relieve the feeling of loneliness and helplessness, 2) to diminish the intensity of the sensory experience, 3) to provide a method of response, 4) to alter the interpretation of the sensations. All of these methods have both conscious and unconscious implications and may be employed by either patient or doctor.

In the first category are to be found all of those varied ways of making an identification with a group which are possible to human beings. The group may be the group of two which constitutes a close and intimate relationship, or it may be any version of the relationship between a human being and a religious, national, scientific, or other type of group. If the term, "love", be considered to refer to this type of loyalty and relatedness between members of a group, the ancient wisdom of the Bible may be again seen in the quotation, "Love has cast out fear." The idea of a persistent group relationship is especially important in those religious groups which depend upon an entirely unseen and intangible deity. In such a group the idea of being accompanied is sustaining: "Yea though I walk through the valley of the shadow of death, I will fear no evil; for thou art with me; thy rod and thy staff they comfort me." It is only an unusual person, however, who is capable of a sufficient degree of faith not to need some tangible evidence of assistance; in ordinary life meetings of the congregation affirm the relationship to the deity and to each other at regular intervals. In times of illness and distress the physical presence of the doctor may be indispensable for supplying the essential human relationship.

The various drugs long used by man in his

attempt to assuage his anxiety have a function which is related both to the diminution in feelings of loneliness and to the actual diminution in the awareness of those sensory data which form the raw material bound together in the perception of anxiety. The drugs employed for these purposes include many old and many new ones. Placebos are tangible evidences of a good intent on the part of the doctor; alcohol acts in part by allowing human contacts to be closer without guilt and in part by reducing the impact of an unpredictable future. Opium and its derivatives have, in addition to a specifically pain-relieving quality, one of allowing the user thereof to assume an Olympian detachment in relation to human beings; whether, in fact, these two actions can be separated one from the other is debatable. A whole new chapter in the history of psychiatry is now being written as experience with the various new "tranquillizing" drugs is accumulated.

In addition to pharmacological methods of reducing the intensity of incident information, there are a number of personality defenses which have the same goal: the various methods include refusal to examine situations closely, both consciously and in the hysterical mechanisms operative at an unconscious level. In turn, the hysterical mechanisms include devices to block out sensation from the external world, such as blindness and deafness, and devices to reduce inputs from the body, such as anesthesias and paralyses.

The obsessional mechanisms have as their most general goal that of providing a method of operation which persists in spite of altered conditions. These methods may be individual rituals, in which case they appear ridiculous; or they may have the sanction of the group, in which case the nonsensical performance can carry with it a great implication of wisdom and reverence. Many medical regimens with elaborate instructions allay anxiety by providing the patient with an invariably relevant course of action.

Methods designed to alter the interpretation of incoming stimuli are myriad, and they range all the way from the naïve methods of denial and of direct reassurance ("it can't be that bad") to the complicated techniques of the psychotherapist. It may be well to emphasize that confrontation with a painful reality is the prime method of the "insight" type of psychotherapy; the impact of the painful fact is reduced by its emergence in a relationship which tends to temper the wind to the shorn lamb.

Summary

This essay traces the development of the concept of anxiety in both biological and social settings from the work of many outstanding investigators of the past half-century. Anxiety is a signal pointing indefinitely to future catastrophe. The form of this signal is an awareness of activity in the thoraco-lumbar division of the autonomic nervous system. The catastrophe is a major alteration in the steady state of relatedness involving "organism" and "environment" or, at a social level, between "individual" and "social system". The inherent response to emergency is direct action, and anxiety as it occurs in human beings depends upon restraint of direct action (i.e., of "acting out"). Control of anxiety may be effected by alterations in the physiological state, in the degree of restraint, in the awareness of the condition, or in the "social milieu".

BIBLIOGRAPHY

1. Beecher, H. K., Lasagna, L., Mosteller, F., and Felsinger, J. M. Von: A study of the placebo response. *Am. J. Med., 16:* 770–779, 1954.
2. Bernard, C.: *An Introduction to the Study of Experimental Medicine,* (1865), New York: MacMillan, 1927.
3. Cannon, W. B.: *The Wisdom of the Body,* New York: W. W. Norton, 1939.
4. Dewey, J., and Bentley, A. F.: *Knowing and the Known.* Boston: The Beacon Press, 1949.
5. Freud, S.: *The Ego and the Id.* London: The Hogarth Press, 1947.
6. Freud, S.: *The Problem of Anxiety.* New York: W. W. Norton, 1936.
7. Gantt, W. A. H.: *Experimental Basis for Neurotic Behavior.* New York: Paul B. Hoeber, 1944.
8. Liddell, H.: The role of vigilance in the development of animal neurosis. In *Anxiety.* Hoch, P. H., and Zubin, Joseph. New York: Grune and Stratton, 1950.
9. Pavlov, I. P.: *Conditioned Reflexes.* London: Oxford University Press, 1927.
10. Selye, H.: The general adaptation syndrome. *J. Clin. Endocrinol., 6:* 117–230, 1946.
11. Sherrington, Sir C. S.: *The Integrative Action of the Nervous System.* New Haven: Yale University Press, 1947.

THE AUTONOMIC NERVOUS SYSTEM AND IMMUNITY[1]

S. LOUMOS, M.D.

The role of the nervous system in the phenomena of immunity (in the genesis of antibodies and the distribution of leukocytes) has been the subject of research by a number of investigators in the past three decades. Most of the relatively enormous literature deals with experimental observations on animals.

Experimental evidence has been accumulating during the past two decades indicating a control of antibody formation, according to the reports of Reitler (23), Bogendorfer (10, 11, 12), Goreczky (14, 15) and A. Belak (5, 6); and a phagocytosis-enhancing capacity of the blood serum by the autonomic nervous system was reported by Ludany and his coworkers (19, 20). S. Belak (7, 8, 9) conducted 400 experiments on the subject and concluded that sympathicotonia (produced experimentally) increases and vagotonia decreases the serum content of the non-specific immune substances, such as normal opsonins and complement. The reverse was reported to be true for specific antibodies, such as antitoxins, agglutinins and lysins. According to S. Belak, the non-specific immune substances are related to the emergency function of the sympathico-adrenal system, which responds automatically and promptly to psychic stimulation, pain, muscular exertion, blood pressure variations, cold and various other changes in the internal and external environment.

Ludany and his coworkers (16, 17, 19, 20), in a series of experiments, also found that in physiological states in which the sympathico-adrenal system is stimulated, the blood serum acquires a greater capacity to enhance phagocytosis. Such is the case in asphyxia, rotatory vestibular stimulation, emotional stimulation both in animals and humans, loss of blood, reduced atmospheric pressure, moderate exercise and artificial pneumothorax. The stimulation of the vagus diminishes the phagocytosis-enhancing effect of the serum.

Therefore, it appears from the literature that immunity and bodily resistance are influenced by the functional condition of the autonomic nervous system and that specific immune reactions are subject to neural influence and may be affected by specific reflex stimulation.

Sometime ago I presented the results of a study of the reaction to typhoid inoculation and to the Schick test in normal people (employees) and in mentally ill people. The study was made in the Elgin State Hospital, on the basis of records kept there and of my own observations. It was found that normal individuals react more strongly to typhoid inoculation and the Schick test than do the mentally ill. The percentage of positive reactions was higher in the normal people.

This study has been repeated at the Chicago State Hospital and was extended to include observations on the reaction to the Mantoux test and to influenza immunization. The reading of the reactions was done by myself (see table 1).

Results

The results have been classified as to the sex of the subject. It is generally believed that the tonus of excitability of the sympathetic system in the average female is different from that in the average male. The results show that a sex difference exists in the reactions to various immunizations.

I do not exclude the fact that perhaps a few mistakes were made in the reading of the reactions of the Mantoux and Schick tests. Most patients scratched the site of immunization, and an extensive redness developed due to skin irritation. Therefore, in these conditions I considered a reaction as positive only when an induration of the skin (at the site of immunization) was present. However, an error of 5–10 per cent (if it was made) does not change the findings.

Comments

There is an obvious difference between normal and mentally ill people, in the degree

[1] Read before the Physicians' Association of the Department of Public Health of Illinois, at the Illinois Medical Society Convention, May 16, 1956.

TABLE 1.—Reactions

Reactions to influenza vaccine

Patients	Total	Negative	Slight	Positive +	Positive ++
Males	241	85.R.35.2%	112.R.46.4%	42.R.17.4%	2.R.09%
Females	246	39.R.15.8%	101.R.41.4%	97.R.39.4%	9.R.3.7%
Normal					
Males	37	8.R.21.6%	16.R.43.2%	11.R.29.7%	2.R.5.4%
Females	50	3.R.6%	12.R.24%	17.R.34%	18.R.36%

Reactions to typhoid vaccine

Patients	Total	Negative	Positive	Slight
Males	498	237.R.47.5%	45.R.9%	216.R.43.5%
Females	482	201.R.41.6%	62.R.12.8%	218.R.45.6%
Normal				
Males	65	5.R.7.5%	25.R.53.8%	25.R.38.4%
Females	93	6.R.6.4%	60.R.64.5%	27.R.29%

Reactions to Schick test

Patients	Total	Negative	Positive
Males	604	462.R.76.5%	142.R.23.5%
Females	561	432.R.77%	129.R.23%
Normal			
Males	60	43.R.71.1%	17.R.28.3%
Females	92	57.R.61.9%	35.R.38.1%

Reactions to Mantoux test

Patients	Total	Negative	Positive
Males	723	208.R.42.4%	415.R.57.6%
Females	519	283.R.53.3%	236.R.46.7%
Normal			
Males	132	42.R.31.7%	90.R.68.3%
Females	226	74.R.32.7%	152.R.67.3%

of their reaction to various kinds of immunization (table 2). Whether this difference in reaction is due to the amount of antibodies, or to phagocytosis, or to something else, has to be clarified. In a previous work (18) in a limited number of cases, I examined the titer of agglutinins, both before and after immunization with typhoid, and found it to be as follows: Very little difference was observed in the agglutinin H, between normal and mentally ill people; but the difference in the agglutinin O was considerable between normal and mentally ill subjects, the titer being higher in the latter. Vaughan and his coworkers (26), in their studies with pertussis, found that schizophrenics have a diminished ability to produce antibodies. Recently a Russian, Shvedskaya (24), found that schizophrenics react little or not at all to typhoid-paratyphoid vaccine. Ten days after the third injection he found no significant changes in the titer of agglutinin; but in cases with a booster dose, ten days after the injection there was a considerably higher titer of ag-

TABLE 2.—Statistical Significance
Difference in negative reaction

	Influenza Immunization	Typhoid Inoculation	Schick Test	Mantoux Test
Between patients, male and female..	Significant beyond .001	Almost significant at 0.05	Not significant	Significant .001
Between normals, male and female..	Almost significant at .001	Better than .50	Significant .30	Not significant .20
Between males, norm. and abn.....	Almost significant at .02	Significant beyond .001	Better than .50	Almost signif. at .02
Between females, norm. and abn.....	Significant at .001	Significant beyond .001	Almonst signif. at .001	Significant beyond .001

glutinins in the normal individuals than in the patients. Another Russian investigator, Danilenko (13), recently found a diminished function of the reticulo-endothelial system in schizophrenics as compared with normal people.

All psychiatrists have observed mental patients suffering from an acute abdomen, ruptured gastric ulcer with peritonitis, gallbladder or renal colic, or coronary occlusion, with little or no subjective complaints of pain. This high pain threshold has been ascribed to many causes, none of them conclusive. The psychological mechanism consists of a withdrawal from reality and pain. Whether this withdrawal from reality is responsible for the lessened or absent reactions to various stimulations, such as the immunization, cannot be stated. Normally, in elderly people and in the first years of infancy, the production of antibodies is less than in the adults, according to reports by Sutliff and Finland (25), as well as Baumgartner (1–4). It is well known that infants and children, as well as old people, have less resistance to infections, especially to pneumonia. Is it a coincidence that the diencephalon is not completely developed in the first years of infancy, and in old people it is damaged by arteriosclerosis? Or, is the diencephalon responsible for the production of antibodies? Victims of apoplectic stroke and patients with concussion of the brain are susceptible to pneumonia. According to statistics presented by Malzberg (21), patients with organic brain disease are very susceptible to pneumonia of all kinds.

The susceptibility appears to vary with the type of mental disease. Schizophrenics are more susceptible to pulmonary tuberculosis, while patients with organic brain disease are susceptible to pneumonia. However, in both conditions, the autonomic nervous system is impaired functionally or organically. On the other hand, maniacs and toxic goiter patients resist infections, especially tuberculosis. Perhaps the increased tone of the sympathetic nervous system increases the non-specific immune bodies, such as the opsonins and phagocytes, and in this way increases the resistance. The same thing appears to be true of persons with high morale. These persons resist infections better, and in case of epidemics, they appear to be more protected.

A cortico-thalamo-hypothalamic mechanism is reported to exist for the regulation or homeostasis of amino acid metabolism. Catatonia decreases and anxiety increases the excretion of hippuric acid, according to Persky and others (22). The evidence I have collected indicates that the same mechanism (cortico-thalamo-hypothalamic) is responsible, in part, for the formation of antibodies which are considered as protein substances, and for the leukocyte distribution. Any changes in this mechanism, functional (emotions, psychic disturbances) or organic, will be followed by changes in the phenomena of immunity and resistance to disease.

With this conception we can explain or have a working hypothesis for various problems yet unsolved. The variation in individual resistance may be due not only to the variable toxicity of the agent but also to a variety of reactions of the individual's autonomic nervous system, which is in part the regulator of resistance and immunity. The polymorphism of a disease may be related to the polymorphism of the reaction of the autonomic nervous

system, which may be in turn related to the individuality of the person (stable or feeble diencephalon-regulated variations of the personality, Schellong). In the same manner, differences in the immunological reactions in the sexes and in races may, at least in part, be explained. In this work mental diseases were considered as a whole and were not studied separately, regardless of whether they were organic or functional. Some writers considered the schizophrenic only in their studies. However, both kinds, functional (especially schizophrenic) and organic brain disease, have to be studied separately in connection with the phenomena of their immunity.

Summary

The enormous work of the last three decades concerning the role of the nervous system in the phenomena of immunity (genesis of antibodies, phagocytosis) deals mostly with experimental observations on animals. These experimental data have impelled this investigator for a second time to find out how the immunity phenomena behave in people with a differently functioning nervous system (mentally ill) in comparison with the so-called normal individuals. For this purpose the degree of reaction to various immunizations (typhoid, influenza, Mantoux test, Schick test) in mentally ill and normal people was studied. This paper concerns the clinical manifestations of various immunizations.

The differences in the degree of reaction to various immunizations in normal and mentally ill persons were found significant. The variations of immune reactions between the sexes were found in all subjects, whether mentally ill or not. The sex difference probably is due to the difference of excitability of the sympathetic nervous system in the average male and the average female.

Future laboratory work is planned to determine the agglutinin titer and the capacity to enhance phagocytosis.

Whether this difference is due to the amount of antibodies or to phagocytosis, or to something else, remains to be determined.

BIBLIOGRAPHY

1. Baumgartner, L.: Relationship of age to immunological reactions. *Yale J. Biol. & Med., 6:* 403, 1934.
2. Baumgartner, L.: Age and antibody production: Qualitative changes in antisera associated with age. *J. Immunol., 27:* 407, 1934.
3. Baumgartner, L.: Age and antibody production: Further observations on qualitative changes in sera associated with age. *J. Immunol., 27:* 417, 1934.
4. Baumgartner, L.: Age and antibody production: Qualitative studies on precipitin-reaction with antisera produced in young and adult rabbits. *J. Immunol., 33:* 477, 1937.
5. Belak, A., Saghy, F., and Cseresznyes, L.: Vegetatives Nervensystem und Immunitat: I. Die Wirkung des Pilocarpins auf die Immunkorperbildung. *Ztschr. ges. exper. Med., 52:* 559, 1926.
6. Belak, A., and Csereszyes, L.: Vegetatives Nervensystem und Immunitat: II. Die Wirkung der Injektion einer Kochsalzlosung auf die Agglutininbildung. *Ztschr. ges. exper. Med., 52:* 567, 1926.
7. Belak, S.: Schutzstoffbildung als vegetative Funktion. *Klin. Wchnschr., 18:* 472, 1939.
8. Belak, S.: Sympathergische (adrenergische) und parasympathergische (cholinergische) Immunitat. *Ztschr. Immunitätsforsch., 100:* 264–292, 1941.
9. Belak, S., and Goreczky, L.: Wirkung vegetativer Gifte auf die Normalopsonine. *Ztschr. Immunitätsforsch. 87:* 365, 1936.
10. Bogendorfer, L.: Ueber den Einfluss des Zentralnervensystems auf Immunitatsvorgange: I. Mitt. *Arch. exper. Path. u. Pharmakol. 124:* 65, 1927.
11. Bogendorfer, L.: Die zeitlichen Verhaltnisse: II. Mitt. *Arch. exper. Path. u. Pharmakol. 126:* 378, 1927.
12. Bogendorfer, L.: Ueber Fragen des Zusammenhangen von Immunitat mit Nervensystem reticuloendothelialom und Endocrinemsystem. *Immunitat. allergie u. infekt., 3:* 133, 1932.
13. Danilenko, V. I.: Influence of functional state of cerebral cortex on adsorptive phagocytic function of reticuloendothelial system and stability of blood colloids in schizophrenia. *Zhur. nevropat. i psikhiat., 54:* 752, 1954.
14. Goreczky, L.: Die Wirkung der vegetativen Gifte auf die bakterizide Fahigkeit des Serums. *Ztschr. Immunitätsforsch., 94:* 183, 1938.
15. Goreczky, L., and Klinkhart, G.: Uber den Zusammenhang zwischen dem vegetativen Nervensystem und der Antitoxinbildung bei Kaninchen. *Ztschr. Immunitätsforsch., 101:* 428, 1942.
16. Huttl, T., Jr., Ludany, G., and Vajda, J.: Die Wirkung des Blutverlustes auf die phagocytosefordernde Fahigkeit des Blutserums. *Ztschr. Immunitätsforsch., 108:* 193, 1951.
17. Kokas, F., Ludany, G., and Vajda, J.: Sympathicoadrenal system and phagocytosis of leucocytes. *Quart. J. Exper. Physiol., 36:* 89, 1951.
18. Loumos, S.: Autonomic nervous system and immunity. *Arch. Neurol. & Psychiat., 68:* 69, 1952.
19. Ludany, G.: Ueber die Aenderung der phagozytosefordernden Eigenschaft des Serums nach direkter Reizung des Splanchnikus und Vagus. *Ztschr. Immunitätsforsch., 94:* 351, 1938.
20. Ludany, G.: Ueber die Wirkung der Asphyxie auf die phagozytosefordernde Fahigkeit des Serums. *Klin. Wchnschr., 17:* 1293, 1938.
21. Malzberg, B.: Mortality among patients with mental diseases. Utica, N. Y.: State Hospitals Press, 1934.
22. Persky, H., Gamm, S. R., and Grinker, R. R.: Physiological factors governing hippuric acid

synthesis in man. Am. J. Physiol., *163:* 740, 1950.
23. Reitler, R.: Zur Kenntnis der Immunkorperbildung im Organismus. *Ztschr. Immunitätsforsch., 40:* 453, 1924.
24. Shvedskaya, A. G.: Certain characteristics of unconditioned specific immunologic reactions in schizophrenia. *Zhur. nevropat. i psikhiat., 54:* 741, 1954.
25. Sutliff, W. D., and Finland, M.: Antipneumococcic immunity reactions in individuals of different ages. *J. Exper. Med., 55:* 837, 1932.
26. Vaughan, W. T., Jr., Sullivan, J. C., and Elmadjian, F.: Immunity and schizophrenia. *Psychosom. Med., 11:* 327, 1949.

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THE CONCEPT OF TESTAMENTARY CAPACITY

Further Observations on the Role of Psychiatric Concepts in Legal Situations

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In previous contributions I have endeavored to analyze in operational terms certain concepts and phenomena fundamental to forensic psychiatry. Thus, commitment (5), malingering (6) and psychiatric expert testimony (7) were studied by examining the role of psychiatric concepts as they occur, or are applied, in specific legal situations. The philosophical orientation and scientific methods of these inquiries have been set forth elsewhere (8) and need not be repeated here. In this essay, a similar approach to an examination of the problem of testamentary capacity will be presented.

The notion of testamentary capacity is probably of little concern to most psychiatrists. Psychoanalysts have paid no attention at all to it. By way of introduction, therefore, I wish to call attention to two considerations which might arouse interest in this subject in those who have no specific interest in this topic and who might even pride themselves on their professional disinterest in matters of forensic psychiatry. One is that the concept of testamentary capacity deals, in effect, with the civil rights of the dead; and the other the fact that in this context the role of economic forces, and therefore one index of social power, is expressed relatively undisguised. Accordingly, the socio-psychological factors that are relevant in this legal situation can be easily demonstrated, and their importance readily assessed.

What constitutes "testamentary capacity"?

According to Henderson and Gillespie, "The point in this matter is to determine, not whether the testator is sane or insane, but whether his mental capacity is adequate to the testamentary act" (3, p. 702). Guttmacher and Weihofen stated: "If the testator was mentally incompetent, the effect can only be to render the will void" (2, p. 344).

Davidson wrote: "A person's mental ability to make a will is known as testamentary capacity. A psychiatrist is frequently called—usually after the subject has died—to tell the court whether the testator did or did not have the mental capacity to make a valid will. A person making a will must (1) know that he is making a will, (2) know the nature and extent of his property, and (3) know the natural objects of his bounty. These are the three 'tests' which, in a sense, the patient must 'pass' before he is considered mentally competent to make a will" (1, p. 99).

"In most medico-legal cases, the doctor examines the patient and testifies as to his findings. In will litigation, the psychiatrist rarely has the chance to examine the testator who is necessarily quite dead when the case comes to court. The practitioner usually has to depend on a hypothetical question describing the testator's behavior and conclude from the hypothesis whether the subject could have passed the three tests on the day he signed the will" (1, p. 104).

One might be tempted to dismiss this entire matter as so much nonsense since these statements deal with nebulous and undefined concepts to which no rational meaning can be given in solely psychiatric terms. Indeed, many psychiatrists—and particularly psychoanalysts—take precisely this position. Yet, by so acting they do an injustice to this subject. Lack of criticism of psychiatric operations in these matters leaves the field uncontested, so to speak, to those who are the official experts of forensic psychiatry. The impression is also created that these medico-legal procedures rest on sound psychiatric grounds, an assumption hotly denied by many who have so little interest in these matters that they never express themselves publicly on their views about forensic psychiatry.

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Summing up the official view of forensic psychiatry on the question of what constitutes testamentary capacity, it may be concluded that the psychiatrists who have professionally addressed themselves to this subject have limited themselves to restatements of certain legal pronouncements which bristle with vague psychiatric terms such as "sane", "insane", "testamentary capacity" and the like. They have not examined what these words might mean, how they are employed in actual practice or what social roles psychiatrists who participate in litigations involving the validity of wills might be playing. These are the questions which I shall attempt to investigate and to answer.

"Testamentary capacity" from the viewpoint of life as a game

Approaching this problem, too, from the point of view of life as a game (8), the following facts stand out as noteworthy and must be accounted for if a meaningful statement of the socio-psychology of testamentary capacity is to be formulated.

1. The issue of the validity of a will—and therefore of the testator's "mental capacity"—arises ***only*** if someone contests a will. This implies a struggle between two or more parties who usually have unequal rights and power.

2. The legal rules about both the making of wills and the right to inherit are clearly defined. While the rules vary from place to place and time to time, what is important in this context is that ***there are explicit rules*** which all the participants in the "inheritance game" are obliged to follow.

3. The legal right to make a will imparts to persons certain civil rights which they retain, so to speak, even after death. Accordingly, in some respects, the dead have more rights than do the living who, for example, are committed to hospitals for "mental illness" (5).

I might add in this connection that our laws, as they now stand, embody the moral precept that it is "right" for a person to have control over his possessions, even after his death, while, at the same time, it is "wrong" for him (or her) to have (full) control over his ***own body*** during his life-time. The legal restrictions on abortion, sterilization, euthanasia —and until recently—suicide itself illustrate this assertion. It seems to me that this touches on a matter that might lend itself to better understanding—and a better exposition of its irrational roots—by comparing it to the early child-parent relationship. In other words, just as the parents own the child's body, so later the state (society) exercises ownership over the bodies of its citizens.

Psychiatrists who write on this subject deal with the question of testamentary capacity as if it were a genuine psychiatric problem, such as can be properly answered by a psychiatrist. We are told, for example, that post-mortem examination of the brain or review of the testator's behavior with members of his family may be helpful in evaluating his "capacity". From a scientific standpoint, this line of approach is entirely misleading. Ethically, it is probably often hypocritical. For the psychiatrist here functions in a situation in which his role as a social force controlling economic gains and losses for the parties involved is quite undisguised.

In other words, when the validity of a will is challenged on the basis of the testator's mental capacity, the real issue is clearly ***not*** this—but simply whether A or B will inherit the property in question. The issue of sanity is decided, of course, in accordance with whether or not—and to what degree—it can be shown that the behavior of the testator, as well as his will, violates the public sense of right. If they do—such as when a rich man tries to disinherit his family and leaves most of his money to his mistress, or a rich woman to her cats—then the chances are great that if the will is contested the court will find that the testator was of "unsound mind". This, of course, is no more than a reaffirmation of the prevalent social sense of right. No psychiatrist is needed to establish such an opinion since it is by definition a matter of "common sense". The psychiatrist's participation in this situation, however, obscures the fact that no scientific (technical) issue is at stake and gives the appearance that a "scientific" decision was reached. Actually all that happened was that a socially validated moral opinion was reaffirmed.

Here, again, the close association should be noted between the open defiance of the public opinion of morality and the notion of mental

illness. Thus, sanity turns out to mean nothing other than being at-one with the opinions and judgments of those who are in power in society at any given time (8). This is hardly surprising if we recall that a "good child" is one who pleases his parents. The difference between these two statements, however, is that no one regards the latter as a scientific concept or abstraction about the child. Rather, it is a simple functional relationship between parent (society) and child (citizen). So it is with the (legal) notion of insanity, whether it pertains to commitment, crime, or the validity of a will.

Forensic psychiatry as a form of social control

The psychiatrist who testifies concerning a deceased person's alleged "insanity"—in this context labeled "testamentary incapacity"—plays a role analogous to that of his colleague who testifies concerning "criminal responsibility". The latter, it was suggested, plays a role in a complex social game that pertains to certain patterns of social action taken against criminal offenders (7). The psychiatrist, on the other hand, who enters into the inheritance game, so to speak, plays a role in a pattern of social action taken against persons who offend the public's sense of decency with respect to how one ought to dispose of one's property after death.

At this point, the question might be asked, "What, after all, is wrong with such social arrangements?" And, indeed, I would hasten to make clear in reply to such a question that it is not my intention to simply criticize this, or similar social arrangements and to suggest others, claiming them to be "better". My immediate aim is more modest although, in the long run and in an indirect manner, studies such as these might conceivably lead to certain changes in the application of so-called psychiatric concepts to various social situations. For the present, however, my purpose is only to demonstrate the pseudoscientific use of psychiatric concepts in certain legal contexts and to call attention to some dangers that seem inherent in an unbridled indulgence in this habit.

Testamentary capacity—in common with commitment procedures, testimony concerning criminal responsibility and others—is a notion and a verbal expression that *implies* a measure of scientific, psychiatric rationality justifying its use. Yet, I submit that these words only *sound* like psychiatry. An analogy with some current practices (in the U. S. A.) in advertising cosmetics, soap, toothpaste and other "health" products may help to clarify my comments about what I think might be some important dangers inherent in the way in which psychiatry is used in some social situations and in which it is advertised to the legal profession.

Manufacturers of cosmetics or toothpaste solemnly assure the public that one product "contains DL-50" and another "XYZ". In this context "XYZ" might refer, for example, to chlorophyll. More often, however, the advertising men use a genuine neologism that does not refer to any known substance. These claims *sound* like chemistry, but no thoughtful person believes that they are in fact scientific statements. Presumably they help sell the various products and are apparently expected in our current science-oriented society. Similarly, I maintain that our legal and commonsense statements about a person's mental state may *sound* like psychiatry or psychology but are, actually, nothing of the sort. This much is probably readily conceded by many psychiatrists and social scientists. Some consequences of this line of thought, however, may arouse more opposition.

The dangerous consequences of this situation are the following. In advertising, pseudoscientific utterances merely result in the better acceptance and greater sale of one product than another. This may be essentially harmless to all concerned. Certainly, it has no effects on chemistry as a scientific discipline. This is not so with the pseudopsychiatric claims of social movements and laws. These procedures, when accepted and successful, become the means whereby certain actions may be taken on behalf of one group of people and against another. For example, in a recent much-publicized case of criminal prosecution in an abortion case, one of the accused parties was acquitted on the basis of psychiatric testimony, whereas two others not so defended were found guilty and sent to jail. The possibility that persons for or against whom psychiatrists testify will become specially favored, or specially discriminated against, members of

society seems to me a very real one. We touch here also on the whole matter of using pseudo-psychiatric notions to support one system of ethics and to condemn others. It is questionable whether this is a legitimate scientific endeavor under any circumstances. Unless it is done explicitly—rather than under the guise of finding "natural laws"—it is assuredly a pernicious practice in the social sciences. The danger of psychiatry and psychoanalysis becoming blindly indentified with the prevailing forces and values of society—possibly *against* the patient and others—must not be minimized. While the advertising techniques of cosmetics' manufacturers holds little danger for chemistry as a science, forensic psychiatry —and perhaps various other methods of "selling" psychiatry and psychotherapy—may well constitute the most important hazard which faces psychiatry as a science today.

Summary and Conclusions

The aim of this study was to present an examination of the concept of testamentary capacity. The usual medico-legal definitions of this concept were briefly reviewed.

Approaching this phenomenon, much as we have done previously, from the viewpoint of life as a game, it was suggested that the psychiatrist who testifies concerning a deceased person's testamentary capacity has entered into, and plays a role in, the complex social rules of the "inheritance game". The rules of this game are the laws and mores governing the inheritance of property.

The practice of forensic psychiatry, it was further suggested, is a form of social control (4). As such, it may be argued, it is as legitimate as any other form of social control. Attention is called to analogies with another prevalent mode of social control, namely advertising. In both, pseudoscientific, or scientifically-sounding, concepts (words) are used in order to bring about certain desired social actions. This habit, while harmless to those sciences which are mimicked in advertising (e.g., chemistry in toothpaste promotion), may be a source of danger for psychiatry which is the alleged basis for bringing about certain actions in legal situations (e.g., "insanity" in relation to criminal action or inheritance). Current practices in forensic psychiatry disguise and obscure the nature of the social transactions in which psychiatrists participate. These practices thus constitute a continuing barrier in the way of an accurate scientific understanding and appraisal of such situations.

These and similar considerations raise fundamental philosophical questions concerning the inroads that psychiatry and psychiatrists make into the domain of the determination of the civil rights and duties of citizens. Increased social acceptance of psychiatry and the concurrent espousal by psychiatrists of the prevailing values of their social environment further augment this danger.

Bibliography

1. Davidson, H. A.: *Forensic Psychiatry*. New York: Ronald Press, 1952.
2. Guttmacher, M. S., and Weihofen, H.: *Psychiatry and the Law*. New York: W. W. Norton & Co., Inc., 1952.
3. Henderson, D., and Gillespie, R. D.: *A Textbook of Psychiatry*, Ed. 7. London: Oxford University Press, 1950.
4. Parsons, T.: *The Social System*. Glencoe, Ill.: The Free Press, 1952.
5. Szasz, T. S.: Commitment of the mentally ill: "Treatment" or social restraint? *J. Nerv. & Ment. Dis.* (In press).
6. Szasz, T. S.: Malingering: "Diagnosis" or social condemnation? *Arch. Neurol. & Psychiat., 76:* 432–443, 1956.
7. Szasz, T. S.: Psychiatric expert testimony: Its covert meaning and social function. *Psychiatry* (To be published).
8. Szasz, T. S.: Some observations on the relationship between psychiatry and the law. *Arch. Neurol. & Psychiat., 75:* 297–315, 1956.

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READMISSION RATES FOR STATE MENTAL HOSPITAL PATIENTS DISCHARGED ON MAINTENANCE ATARACTICS

Findings with a Matched Control Group and Methodological Considerations

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This paper reports the results of an attempt to evaluate the adaptation of patients leaving a state mental hospital on ataractic medication (chlorpromazine or reserpine), using as single criterion continuity of extramural residence. The difficulties encountered in such an attempt are discussed.

Material and Methods

A group of 67 patients was identified who met the following criteria: (a) discharged to an after-care clinic during the 8-month period from August, 1955, to March, 1956; (b) release on daily ataractic medication; (c) continuity of supervision. Characteristics of sex, age, diagnosis, and length of hospitalization were determined for each patient, and a matched comparison group was established of 67 patients discharged during an equal period of time,[1] beginning 18 months previously. (Neither chlorpromazine nor reserpine was used at Creedmoor State Hospital in treatment of patients prior to March, 1954.)

Fifty-five patients in the treated group received chlorpromazine, 8 received reserpine, and 4 received both drugs. The dosages of maintenance medication with chlorpromazine varied from 75 to 600 mg. a day, the average being 200–300 mg.; for reserpine the approximate daily dosage average was 2 mg.

Additional study of the treated group compared the course of those who continued to take the medication and those who discontinued, with regard to the criterion of readmission.

Results

At the end of the follow-up periods (from 4 months to 1 year), 7 (10.4%) of 67 patients discharged on medication had returned to the hospital. From the comparison group, 11 (16.4%) of 67 were readmitted (see table 1).

[1] From Aug., 1953, to March, 1954.

Further study of the 67 patients in the treated group showed that of the 54 who continued medication during the entire follow-up period, 5 (9.2%) returned; of the 4 who discontinued, none returned; of the 9 who took medication regularly, 2 (2.2%) returned.

Table 1 provides diagnostic grouping of the matched groups and shows that of 48 treated patients diagnosed schizophrenic reaction, 3 returned (6%), and of 48 comparison (untreated) patients diagnosed schizophrenic reaction, 8 returned (16%).

Three patient categories by duration of hospitalization have been suggested by Crandell *et al.* (3): the long-term chronic (2 years and over of continuous hospitalization), the short-term early cases, and the "oscillating" cases (repeated movements in and out of hospital). Breakdown of figures with respect to these categories is shown in table 2.

Of 26 chronic treated patients, 2 returned (7.9%), while of 23 comparison chronic patients, 5 (21.5%) returned.

Discussion of the Findings

The difference between the rates of return of the treated and comparison groups as wholes falls short of statistical significance (χ^2 = 1.03). Also, patients who discontinued taking medication or who took it irregularly did not show a significantly different rate of return compared to patients who took medication regularly.

However, further analysis of the data shows that patients on medication with diagnosis of schizophrenic reaction had only a 6 per cent rate of return in contrast to the comparison group with the same diagnosis and a rate of return of 16 per cent. This result is corroborated by other studies. Kinross-Wright (4) studied 108 patients with diagnosis of schizophrenic reaction who were given intensive chlorpromazine treatment and released on a

TABLE 1.—DIAGNOSES OF MATCHED GROUPS OF DISCHARGED PATIENTS AND READMISSIONS

Diagnosis	Readmissions		
	Sub-totals	Treated	Comparison
Schizophrenic reaction	48	3	8
Manic depressive reaction	4	1	1
Involutional psychosis	11	0	2
Senile psychosis	2	2	0
Other	2	1	0
	67	7	11

TABLE 2.—DURATION OF HOSPITALIZATION AND RATE OF RETURN IN MATCHED GROUPS OF DISCHARGED PATIENTS

	Treated Group		Comparison Group	
	Total	Returns	Total	Returns
Short term	30	3	29	2
Oscillating	11	2	15	4
Chronic	26	2	23	5
	67	7	67	11

maintenance dose. He showed that after a follow-up period of 6 to 12 months, only 12 per cent were returned to the hospital.

His study lacked a control group and made reference for comparative purposes to the statistics of Alexander (1). Shepherd and Watt (6) noted the paucity of controlled intramural trials reported on chlorpromazine (1 in 4) and reserpine (2 in 8). Such controlled trials on out-patient groups are even more scarce.

Data of this study relating readmission to duration of hospitalization suggest that chronic treated patients show a lesser rate of return than patients of the same category in the comparison group. This finding questions that derived from studies by Crandell *et al.* (3) on the prognostic value of "mobility" during the first two years of hospitalization, that the outcome for patients with more than 600 consecutive days in the hospital is invariably poor.

DISCUSSION OF THE METHOD

The original design for this study was to follow for a period of 6 months to a year or more all patients (123) released from Creedmoor State Hospital during a 6-month period on maintenance ataractic medication. These were patients who, in the opinion of the responsible psychiatrists, at the time of their discharge were unable to function outside the hospital without daily medication. A comparison group was selected, consisting of all patients (433) who were released during this same period of time who were not discharged on medication.

The rate of return to the hospital in both groups and the length of time prior to rehospitalization were to be compared, and it was hoped that continuity of medication or no medication status would permit conclusions to be drawn.

The vicissitudes of the follow-up operation became apparent very soon after the study was begun. Discharge summaries of patients released on ataractic medication often did not include the required specific maintenance recommendation, so that all drug treated patients were not included. The entire chart of every patient discharged was therefore searched to determine whether maintenance medication had been recommended.

Furthermore, it became apparent that continuity of medical responsibility, and uniformity and completeness in treatment records were often not satisfactory for research purposes. The same patient was often seen by different physicians in the clinics, and it was not always possible to discover whether medication had been discontinued or changed in dosage or form.

Data describing the comparison group were similarly vitiated. In one clinic, the physician in charge believed very strongly in the efficacy of the medication under study, and because of his interest and concern the drug was given to any patient at the first sign of relapse, whether or not he had been discharged from the hospital on maintenance dosage. It became apparent also that many patients in the comparison group were receiving ataractic medication from their family physicians, without sharing this information with the clinic.

The ideal and desirable follow-up design therefore emerged as one established with the understanding and participation of all personnel in the treatment and guidance of the

patients to be followed. The experimental and control groups would be carefully matched, as in this study, patient to patient, by age, sex, diagnosis and length of hospitalization, and each patient followed for a full year or more. Continuity of responsibility, resting ultimately on one person, would be essential. To this end, and in order to avoid confusion, it is probable that the groups being studied would be better controlled if they attended the same clinic, and were seen by the same personnel. For state hospital populations, this would require subjection of routinized policies and practices to design requirements—an operation not easily accomplished. An approximation to these circumstances has now been made by Kris (5) at the Manhattan Thorazine Clinic, although no control provision has been possible. Controls of suggestion by placebo, of observer-bias by double-blind design, and of other therapy variables by environmental manipulation are design requirements receiving increasing recognition in experimental psychiatry. All are notoriously difficult to meet with intramural populations and even more so with clinic populations in follow-up or out-patient status.[2]

Summary and Conclusions

Readmission rates for 67 state hospital patients discharged on maintenance ataractic medications were determined for periods of from 4 months to one year, and compared with a matched control group. The difference between rates of return for treated and control groups was not statistically significant. However, the subgroup with diagnosis of schizophrenic reaction showed a return rate of 6 per cent compared with a rate of 16 per cent for the control group. Some difficulties in design of follow-up studies, with special reference to state hospital populations, are described.

[2] Follow-up study of large populations is usually prohibited by cost; selection of small experimental and control groups become progressively limited with addition of each variable (Columbia-Greystone Associates, 2, p. 17).

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Bibliography

1. Alexander, L.: *Treatment of Mental Disorders.* Philadelphia: W. B. Saunders, 1953.
2. Columbia Greystone Associates: *Selective Partial Ablation of the Frontal Cortex.* New York: Paul B. Hoeber, Inc., 1949.
3. Crandell, A., Zubin, J., Mettler, F. A., and Kugelmass, N.: Mobility in chronic schizophrenias with special regard to psychosurgery. *Psychiatric Quart. 28:* 185–210, 1954.
4. Kinross-Wright, V.: The intensive chlorpromazine treatment of schizophrenia. Psychiatric Research Report I. APA Regional Research Conference, Univ. of Texas, Medical Branch, Galveston, Texas, February, 1955.
5. Kris, E. B., and Carmichael, D. D.: Follow-up study on patients treated with Thorazine. Am. J. Psychiat. *112:* 1022, 1956.
6. Shepherd, M., and Watt, D. C.: A controlled clinical study of chlorpromazine and reserpine in chronic schizophrenia. *J. Neurol. Neurosurg. & Psychiat., 19:* 232–235, 1956.

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HYPNOSIS AND SCHIZOPHRENIA

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Hypnosis and schizophrenia are two common mental phenomena which excite speculation and controversy. Although we are generally aware of what we mean when we use these words, we are unable to agree on an explanation of these phenomena, nor can we give them exact limits. The incompleteness of our knowledge is catalogued for schizophrenia by many, including M. Bleuler (3), and for hypnosis by Brenman and Gill (5) and Gorton (15). It is the purpose of this paper to discuss separately and then to compare these two phenomena with the hope of gaining greater insight into schizophrenia.

Hypnosis

Hypnosis has been compared to sleep (16, 18, 26). However Hull (16), Brenman (6), and Gorton (15) cite physiological studies which indicate that the two states differ. For example during hypnosis the electroencephalogram, the achilles tendon reflex, the electrocardiogram, the BMR, and respiration all resemble those obtained during wakefulness rather than sleep. Indeed the fact that hypnotized subjects may fall asleep indicates that the two states are different. White (31) proposes that hypnosis is "goal-directed striving, its most general goal being to behave like a hypnotized person as this is continuously defined by the operator and as this is understood by the subject." However, this proposal fails to emphasize the fact that an altered mental state seems to develop in the deep hypnotic trance. It is difficult to picture "goal-directed striving" *per se* producing the amnesia, hallucinations, anesthesia, changes in psychogalvanic skin resistance and changes in pulse rate (15) which are seen during hypnosis. These, and the unconfirmed reports of appearance of the Babinski sign in hypnotic age regression to six months, EEG reversion to normal in regression to a pre-seizure period (15), and changes in body temperature (22) indicate that the trance state can be profoundly different from the waking.

But in what manner is the trance different? There is good evidence that hypnosis results in some loss of ego function or of *critical faculty* —that portion of the personality which organizes and censors thinking, and is responsible for critical self-awareness. This loss is indicated by distortion of body image, emergence of "archaic modes of thought" and release of emotion and motor control in hypnosis (6, 7). I have also seen these phenomena under hypnosis, but was especially interested in disorders of thinking. Proverbs for interpretation and words for differentiation were presented to normal individuals and to two psychoneurotic subjects while they were in a hypnotic trance and again while they were awake. Many of the responses were acceptable, but most subjects showed some concrete and occasionally bizarre answers while in a trance which were not given when they were awake. Bizarre responses occurred more often in subjects who achieved a deeper trance. An example is the following interpretation of the proverb, "It's the roving bee that gets the honey", given by one of my subjects. In the trance he said, "Roving bee gets the honey. It's the busy one, one that keeps busy; he gets the honey." Notice the repetition and concrete response. The subject was coaxed, but he "blocked" and gave no answer. He was coaxed again and asked what the proverb meant in relation to life in general. He responded with another proverb, "You reap what you sow", thus failing to indicate the precise meaning of the "roving-bee" proverb. When the subject was awake, he had amnesia for the trance; when he was asked the meaning of the proverb, he quickly and acceptably responded, "The person who goes out and works is the one who gets the results."

The subjects usually had total amnesia for the trance period; however, there is the possibility that some learning occurred between the trance and waking periods. Accordingly, two subjects were asked to interpret proverbs in the waking state first, then were hypnotized and asked to interpret them again. Although they gave acceptable responses in the waking

state, both gave several concrete or bizarre responses to the same questions while in the trance. For example, when asked to tell the similarity between an ant and a tree, one subject said that they were both "insects".

Benjamin (21) mentions that in schizophrenics inability to interpret proverbs correctly indicates a disorder of thinking, or as Goldstein (21) would say, a defect in the "abstract attitude". It is thus apparent that in hypnosis, too, a loss of "abstract attitude" may appear. Rhodes (25) evidently refers to this same loss when he says that in hypnosis there is abduction of the "objective mind" leaving only the "subjective mind" which cannot do "inductive reasoning".

Earlier, evidence for loss of ego function was mentioned. Since the ego—or *critical faculty* of the mind—organizes volition and thought, it seems evident that it is basic to "abstract attitude". Accordingly, we reach a deeper level which includes "abstract attitude" when we say that the basic change in hypnosis is a decrease in the ego, or *critical faculty*.

There is further evidence to support this since mental activities other than reasoning are also affected in hypnosis. Hull (16) reports well-controlled experiments in which there was a significant decrease in the ability of subjects to read and do arithmetic when in a trance.

How shall I explain the ability of my subjects to correctly interpret many of the proverbs given them? It may be due to fluctuations in ego strength, or it may be that they had known the proverbs in the past. Cooper and Erickson (9) point out that tasks which have been solved in the past may be readily done under hypnosis; whereas new tasks, such as unfamiliar mathematical reasoning, are not.

Schizophrenia

Most investigators agree that when they use the term "schizophrenia", they refer to the symptom complex described by Kraepelin (23) and Bleuler (4). However, the causes of the disease, or even that it is one disease, are widely debated. There are those who seek organic causes (3), those who seek functional causes (3), and those, like Sullivan (29), who feel that there are two diseases: one of functional and one—with worse prognosis—of organic origin. Kallmann's (20) work is excellent evidence of genetic organic factor(s) (26). But the question of whether or not schizophrenia is one disease, and whether the "specific cause" (12) is organic or functional, remains to be answered.

I will try to avoid conjecture and controversy by discussing characteristics of schizophrenia which are widely accepted (24, 27), Bleuler's (4) fundamental and secondary symptoms. Noyes (24) says of schizophrenia, "We find a group of psychotic reactions characterized by disturbances in the harmonious blending and co-ordination of the various elements and aspects of the personality. In this disorder of the personality functional mood tends to be inappropriate, thought disorderly, and behavior maladaptive." In this last sentence he refers to Bleuler's fundamental symptoms: disturbances of affect and association, autism, and ambivalence. Usually accessory symptoms such as hallucinations, delusions, or catalepsy are also present, but the pattern of symptoms varies from case to case. Disturbance of affect, autism, and ambivalence may also vary, whereas disturbances of association always seem to be present. Accordingly, Bleuler felt that this was the basic symptom of the disease. For similar reasons Arieti (1) felt that all of the symptoms may be "reduced, in the final analysis, to impairment in a greater or lesser degree of what Goldstein calls the abstract attitude."

But in the discussion on hypnosis above we have already seen evidence that the ego, or *critical faculty*, is basic to "abstract attitude". Furthermore there is other evidence that in schizophrenia, like in hypnosis, more than "abstract attitude" is impaired. Kraepelin (23) documents the well-known fact that work capacity is often decreased in schizophrenia. Bleuler (4) reports that schizophrenics show a defective reproduction of reading material after a ten-second interval. He concluded that it was due to "defective integration" of memory material rather than frank memory loss. Recently Chambers (8) reported significant impairment of simple learning performance as well as judgment in schizophrenics. Binder (2) presented a careful study which indicated that schizophrenics show as much impairment in tasks which require the reproduction, in a familiar and routine manner, of previously

learned material, as in tasks which require abstraction and generalization. But attitude toward work, interest in test situations, and incentive toward memorizing as well as "abstract attitude" are all organized by the ego, or *critical faculty*. We thus reach the conclusion that hypnosis and schizophrenia have the same basic factor: impairment of the *critical faculty* of the mind—or, if you prefer, impairment of the ego. It is this impairment which releases the "archaic modes of thought" common to both phenomena.

Interestingly, Jung (19) reported work done by Stransky (28) in which normal subjects talked rapidly while their attention was relaxed. During this reversible relaxation of the *critical faculty*, their productions resembled those of schizophrenics. "Archaic modes of thought" seemed to appear, thus supporting my feeling that the latter merely reflect the relatively unorganized and uncensored productions of the mind.

White (32) makes the provocative statement that schizophrenia results because "interest in adjusting to reality has become secondary to other interests." This may well be true, but it fails to emphasize the fact that an altered mental state seems to develop in many cases of schizophrenia. It is difficult to picture "withdrawal of interest" *per se* as producing amnesia, hallucinations, and the appearance of the Babinski sign in deep catatonia (14). I mentioned earlier that it seemed likely that hypnosis also yielded an "altered mental state". We have seen that both hypnosis and schizophrenia result in decrease of the *critical faculty*; if there is an "altered mental state" in both, as the evidence suggests, it is secondary to this.

Comparison of Hypnosis and Schizophrenia

Evidence has been presented that hypnosis and schizophrenia have their most basic factors in common. What then about the other, secondary factors? Here, too, there is a remarkable parallel between the two phenomena.

A. Bleuler felt that secondary to the disturbance of association in schizophrenia were condensation, distortion, and neologisms. But similar phenomena are seen under hypnosis: Wolberg (33) writes that automatic writing "condensations, phonetic spellings, punning, literary allusions, and fragmentation of letters are common. Single letters may stand for words and numbers, and *peculiar symbols may indicate words and ideas.*" (Italics mine.) This later is particularly reminiscent of the crude symbolism we often see in the writing of schizophrenics.

B. Impulsive acts are often seen in schizophrenia and are reported in hypnosis by Brenman, Gill, and Hacker (7). A subject in a trance "discussing the pros and cons of divorce, suddenly seized her wedding ring and flung it across the room." Relatively free access to the unconscious is also common in both phenomena (6).

C. Disturbance of affectivity is one of the frequent characteristics of schizophrenia. Brenman (6) referred to "free access" to emotion in hypnosis but did not mention flattening of affect. I have often observed the latter, in normal hypnotized subjects, as I am sure others have. For example, a hypnotized student nurse was told to prevent anyone from sitting in a certain chair. When another student tried to sit in it, the former pushed her away. When the second student asked to be allowed in the chair, the former said, "You cannot sit in the chair." Her voice was an inflectionless monotone, her face without expression, and her motions stiff, thus resembling a "flat" schizophrenic.

D. Ambivalence, one of the frequent characteristics of schizophrenia, is reported in normal hypnotized subjects (7).

E. Autism, also one of the frequent characteristics of schizophrenia, is suggested in hypnosis by Brenman's statement that the hypnotized subject seems to turn his attention inward. Like the schizophrenic, his attention and spontaneity are decreased. Indeed catalepsy, felt to represent extreme withdrawal in schizophrenia, can be induced in normal subjects by hypnosis.

F. Disturbances of sensation and perception are seen in schizophrenia and are common in hypnotized subjects (18). Distortions of body image are common in schizophrenia (30) and are also reported in hypnosis (6). They have also been reported to me by normal subjects following hypnosis. A student nurse reported, "I felt big and fat like I had an enormous

tummy; and I felt like I had great big long legs and arms." She felt this early in a trance for the rest of which she had total amnesia.

G. Disorientation is occasionally seen in schizophrenia (4) and may be induced in hypnosis by age regression.

H. In schizophrenia there is often amnesia for the period of onset (4), as is generally known. This amnesia may be absent, partial, or complete; similarly amnesia may occur in hypnosis (18), and may also be absent, partial, or complete.

I. Hallucinations and delusions are common in schizophrenia (24) and may be induced in normal hypnotized subjects (18).

J. Blocking is often seen in schizophrenics (24). I have seen a similar phenomenon in hypnotized subjects, and it may be noted earlier in my example of proverb interpretation in the section on hypnosis.

K. According to Arieti (1) and Jelliffe (17) a peculiar quality of the eyes is often present in schizophrenia. The descriptions sound like the "staring quality" of the eyes of many hypnotized subjects with which we are all familiar (6); I have often seen a similar "staring quality" of the eyes among schizophrenic patients.

L. There appears to be a parallel between the severity of a schizophrenic reaction and the depth of hypnosis. Fenichel (11), among others, feels that the severity of a reaction is measured by the developmental level from which the symptoms arise. Thus hysteria, obsessive-compulsive reaction, manic or depressive reactions, paranoid reaction, and deep catatonia are in increasing order of severity and are said to have their roots more or less in the oedipal, anal, oral, narcissistic, and intrauterine stages, respectively. In hypnosis the depth of the trance can be estimated by a scale devised by Davis and Husband (10). Glove anesthesia; personality changes; kinesthetic delusions; and bizarre suggestions, somnambulism, and hallucinations are in order of increasing depth of hypnosis, and could correspond to hysteria, obsessive-compulsive reaction, manic or depressive reactions, and schizophrenia, respectively.

M. In schizophrenia there is often a tendency to be on the defensive and to use projection (24), depending on the personality of the patient. Likewise, defensiveness and a tendency to project may be seen under hypnosis; here, too, the appearance of these phenomena may depend on the personality of the subject. Freud (13) mentions that a subject who "carries out a post-hypnotic suggestion and is asked why he is acting in this way, instead of saying he had no idea", feels compelled to "invent some obviously unsatisfactory reason." Hull (16) reports that Janet produced post-hypnotic writing in one of his subjects. When Janet showed her the production, the subject insisted that the doctor had copied her signature.

It may well be that such defensiveness and projection are generally secondary to the challenge of a strong belief. World History also suggests this. Thus, delusions may be the basis for paranoid feelings regardless of whether or not they occur in schizophrenia. It only happens that schizophrenics have more delusions. This would support the statement of Tausk (30), "The patient invents (ideas of persecution) in order to justify his delusions of grandeur." Furthermore, it jibes with Fenichel's (11) discussion of paranoid feelings as "restitutive" phenomena because it represents the attempt of the remainder of the ego to justify what it "knows". It may indicate the existence of at least some intact ego, or *critical faculty*; if there were none, no need to defend would be felt nor would there be any faculty to perform the projection.

Theory

Similarities of the superficial and the basic phenomena of both schizophrenia and hypnosis have been shown. What, then, is the difference between them? Hypnosis is a temporary state which is usually induced by the suggestive influences of another person. Schizophrenia, on the other hand, is more permanent and lacks the obvious suggestive factor present in hypnosis.

It is here that I approach the most important, and perhaps the most debatable, thesis of this paper: that regardless of the "specific cause" of schizophrenia, be it functional, organic, or genetic, the *mechanism* of its symptom formation is analogous to the induction of hypnosis.

In schizophrenia there is a tendency to

withdraw from personal contacts. This tendency is often conscious and voluntary and would be analogous to a subject in hypnosis who cooperates with the hypnotist to sit comfortably and relax. But in schizophrenia there are also unconscious forces which constantly work against the *critical faculty*. These are analogous to the repeated suggestions of the hypnotist. In other words, it is proposed that schizophrenia is a *suggestive* phenomenon, resulting from the unconscious forces within the personality of the patient. Regardless of the particular dynamic configuration of these forces, it is their constant action from within which may finally overwhelm the *critical faculty* in schizophrenia in the same manner that the suggestions of the hypnotist finally overwhelm the *critical faculty* in hypnosis.

Objections to a functional theory of schizophrenia are often based on the fact that such *bizarre* symptoms and behavior can be seen (32). However, the very fact that phenomena and behavior just as bizarre can occur functionally in hypnosis is a strong suggestion that schizophrenia is predominantly functional too.

As Jung (19) points out in comparing the dynamics of hysteria and schizophrenia, one should be economical with new principles of interpretation. This also applies to the thesis that the mechanism of schizophrenia is suggestive, and similar in nature to hypnosis. Is it not often that our patients tell us that they have been hypnotized, mesmerized, etc.? Perhaps, in a sense, they are correct.

There are many investigators who tend to feel that schizophrenia is the end result of "repressed memories and ideas heavily loaded with emotion" (24). Despite many specific differences among them, however, there is a gross similarity in the ideas of many of these investigators. I think most of the "fundamentalists" would agree that probably basic to the schizophrenic are feelings of inferiority which, when confronted with reality, result in discomfort and a tendency to withdraw. Regardless of whether they result from strong, unsatisfied drives in conflict with the superego, or whether they result from the positive feedback of awkward interpersonal relations, these feelings seem to exist. But every psychic force seems to have a counterforce; thus, feelings of inferiority generate the wish for superiority. Consider the following example from Noyes (24): The War Department notifies a woman that her husband has been killed; but despite confirmation of the fact, the woman maintains that the body is someone else's and her husband is alive. This is a delusion, and we understand the motive for it when we learn that among the dead man's belongings were love letters from another woman. The wife has created this delusion in order to protect herself from the painful realization that she was not first in her husband's affection. This example tends to support Freud's (13) statement that both dreams and insanity have the common goal of *wish-fulfillment*. However, an example of the opposite process—fulfillment of an individual's worst fears—is given by Arieti (1). A student who spent several days cramming for an examination had strong anxiety that he would not complete his preparation. Thus, instead of hearing the tower bell sound every hour, which it did, he thought he heard it every ten minutes. But both examples, whether they represent wish-fulfillment or not, demonstrate a partial disruption of the ego, or *critical faculty*, by internal forces. This process, so frequent in schizophrenia, is clearly similar to the partial ego disruption of the post-hypnotic phenomena.

Paranoia is also similar to post-hypnotic suggestions since only a small part of the *critical faculty*, or ego, has given way under the impact of unconscious forces, while the rest of the ego works to systematize the delusion and defend it by projection. In paranoid schizophrenia, however, perhaps because of stronger unconscious forces, many delusions appear and are far more difficult to systematize. There are many more defects in the *critical faculty*, and hence there is a greater likelihood of seeing disturbances of thinking. These thinking disturbances seem most likely to occur in an area of delusion and ego defect. Thus, a young schizophrenic who had delusions of persecution, disordered body image, and strong feelings of guilt regarding sexuality was able to interpret many proverbs acceptably and to properly differentiate lie from mistake and midget from child. However, when he was asked the difference between a man and a woman, his answers became vague, irrelevant, and typically "schizophrenic". He was like a post-hypnotic

subject whose peculiar post-hypnotic act has been challenged and who gives bizarre rationalizations but otherwise shows an intact *critical faculty*. However, the severe schizophrenic who can answer few questions without bizarre answers shows a marked defect in his *critical faculty*, and is thus like a deeply hypnotized subject. He is especially receptive to further suggestive influence from unconscious forces which bring voices to the lonely, punishment to the guilty, and power to the weak.

Summary

Two common mental phenomena, hypnosis and schizophrenia, are discussed and compared. A concept of the mechanism of development of schizophrenia is offered: that schizophrenia is a suggestive phenomenon analogous to hypnosis; that it results from the unconscious and perhaps conscious conflicts and forces present in the schizophrenic; and that these forces continuously influence the *critical faculty*, or ego, until it is partly or completely subdued. The result is the picture which we commonly schizophrenia.

BIBLIOGRAPHY

1. Arieti, S.: *Interpretation of Schizophrenia*. New York: Robert Brunner, 1955.
2. Binder, A.: *J. Abnorm. & Social Psychol., 52:* 11–18, 1956.
3. Bleuler, M.: *Research and Changes in Concepts in the Study of Schizophrenia, 1941–1950*. Bull. of the Isaac Ray Memorial Hospital, Vol. 3, nos. 1 and 2, 1955.
4. Bleuler, E.: *Dementia Praecox*. New York: International Universities Press, 1950.
5. Brenman, M., and Gill, M.: *Hypnotherapy*. New York: International Universities Press, 1947.
6. Brenman, M.: in Abramson, H. A. *Problems of Consciousness*. Transactions of the First Conference. New York: Josiah Macy, Jr. Foundation, 1951.
7. Brenman, M., Gill, M. M., and Hacker, F. J.: *Bull. Menninger Clin., 11:* 60–66, 1947.
8. Chambers, J. L.: *J. Consulting Psychol., 20:* 211–214, 1956.
9. Cooper, L. F., and Erickson, M. H.: *Time Distortion in Hypnosis*. Baltimore: The Williams & Wilkins Co., 1954.
10. Davis, L. W., and Husband, R. W.: *J. Abnorm. & Social Psychol., 26:* 175–182, 1931.
11. Fenichel, O.: *The Psychoanalytic Theory of Neurosis*. New York: W. W. Norton, 1945.
12. Freud, S.: *Collected Papers*, Vol. 1. London: The Hogarth Press, 1924, pp. 138–154.
13. Freud, S.: *Interpretation of Dreams*. New York: Basic Books, 1955.
14. Gidro-Frank, L., and Bowersbuch, M. D.: *J. Nerv. & Ment. Dis., 107:* 403–458, 1948.
15. Gorton, B. E.: *Psychiatric Quart., 23:* 317–343, 457–485, 1949.
16. Hull, C. L.: *Hypnosis and Suggestibility*. New York: D. Appleton Century, 1933.
17. Jelliffe, S. E.: In *Schizophrenia*. Association for Research in Nervous and Mental Disease. New York: Paul B. Hoeber, 1928.
18. Jenness, A.: In *Personality and Behavior Disorders*, Vol. 1. Hunt, J. M. New York: The Ronald Press, 1944.
19. Jung, C. G.: *Psychology of Dementia Praecox*. United States: Nervous and Mental Disease Pub. Co., 1909.
20. Kallman, F. J.: *Am. J. Psychiat., 103:* 309–322, 1946.
21. Kasanin, J. S.: *Language and Thought in Schizophrenia*. Berkeley: University of California Press, 1951.
22. Kline, M. V., and Guze, H.: *J. Clin. & Exper. Hyp., 2:* 233–237, 1954.
23. Kraepelin, E.: *Dementia Praecox*. Edinburgh: E. and L. Livingstone, 1919.
24. Noyes, A. P.: *Modern Clinical Psychiatry*, Philadelphia: W. B. Saunders Co., 1948.
25. Rhodes, R. H.: *Hypnosis: Theory and Application*. New York: Citadel Press, 1950.
26. Schilder, B.: *Medical Psychology*. New York: International Universities Press, 1953.
27. Strecker, E. A., Ebaugh, F. G., and Ewalt, J. R.: *Practical Clinical Psychiatry*. Philadelphia: Blakiston Co., 1951.
28. Stransky: *Uber Sprachwerwirrtheit*.
29. Sullivan, H. S.: *Conceptions of Modern Psychiatry*. Washington: William Alanson White Psychiatric Foundation, 1947.
30. Tausk, V.: In *The Psychoanalytic Reader*, Vol. 1. Fliess, R. New York: International Universities Press, 1948.
31. White, R. W.: *J. Abnorm. & Social Psychol., 36:* 477–505, 1941.
32. White, R. W.: *The Abnormal Personality*. New York: Ronald Press, 1948.
33. Wolberg, L. R.: *Hypnoanalysis*. New York: Grune and Stratton, 1945.

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CHANGES IN AVOIDANCE CONDITIONING FOLLOWING PSYCHOTHERAPEUTIC TREATMENT

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The use of avoidance conditioning in human subjects as a method for the diagnostic determination of conditions adversely affecting the functional integrity of the cortex was proposed originally by Gantt as early as 1938. In a series of subsequent studies the method was advocated for the determination of Korsakoff's syndrome (1), generalized cortical pathology (2), and for the differentiation of psychogenic from organogenic psychoses (3).

The rationale for the clinical use of this test lies in the experimental observation that natural (human) or deliberately produced (animal) cortical lesions often result in the abolition of or decrement in previously established conditional reflexes and in a markedly increased difficulty in the formation of new conditioning. Gantt (1) found that patients with Korsakoff's syndrome failed to condition in a simple avoidance situation with visual CS's.

In a previous unpublished study performed on a group of elderly psychotic patients with and without neurological evidence of cortical damage, the following findings relevant to the question of validity were obtained:

1. All patients who had evidence of cortical pathology on the basis of EEG and neurologic examination failed to condition.

2. In another group matched for age and NP diagnosis but without EEG and neurological evidence of cortical pathology, approximately 50 per cent failures in conditioning were encountered.

3. Repeated neurological examination of the portion of this latter group who failed to condition did not reveal demonstrable signs of cortical pathology.

Two possible explanations of these findings were advanced:

a) Since all patients with clinically demonstrable signs of neurologic damage failed to condition and a portion of the group without these signs also failed to condition, the technique of conditioning may more sensitively reflect early or diffuse cortical damage than orthodox neurological procedures, or,

b) The failure of a patient to condition may be due to a *complex* of factors, among which is the factor of cortical pathology. If, for example, failure to condition reflects a lowered level of cortical efficiency, then cortical damage may only be considered a special case of irreversible degradation of function. Transient disturbances in cortical efficiency should be revealed by testing during disorder and following recovery.

The present study begins with the hypothesis that factors other than those of cortical pathology may influence conditioning and tests the validity of this assumption. The problem was that of determining changes in conditioning ability in a control and matched experimental group of psychiatric patients from a period prior to the beginning of group psychotherapy to a period immediately following the termination of the therapy. If changes in conditioning ability could be found in the experimental group (receiving psychotherapy) but were not found in the control group (resident on the ward, but not receiving psychotherapy), the hypothesis would be supported.

METHOD

Thirty-three chronic ward patients participated in the study. They represented the population of an entire ward except for evident cases of neurologic damage, epilepsy, etc. which were excluded from the study. The groups were divided randomly into seventeen controls and sixteen experimental patients. The latter group was subjected to various psychotherapeutic manipulations directed toward enforcing social interchange and the formation of small groups. This study was performed by other workers, and the results will be reported separately.

Conditioning procedures were performed on

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the entire thirty-three patients prior to the beginning of therapy. Following completion of the therapy in approximately three months the entire group was retested.

The procedures for conditioning are described fully elsewhere (4). They involve the presentation of paired light and tone stimuli at one-minute intervals alternately reinforced by a painful faradic shock of one-second duration to the right hand. A cradle for the right arm provides both a measure of motor reactivity and a means for avoidance of the shock. Continuous PGR recordings are made throughout the whole conditioning session. After 10 trials the subject is instructed to avoid shock by pressure on the right arm rest in anticipation of the shock. The stimuli are then continued, and a graded series of instructions are given after each successive failure in response until the final instruction is a clear and explicit direction to depress the rest at the presentation of a specific light and tone. The auditory stimulus was paired with the visual one to prevent the subject from disregarding the localized visual stimulus and failing thereby.

A final numerical score was obtained by summing separate scores for the following: 1) quality of CR formation, defined in terms of the trial number at which first evidence (autonomic or motor) of a CR appeared to the CS; 2) quality of differentiation between positive and negative stimuli, defined in terms of the differences in amplitude of the same responses to reinforced and unreinforced CS's; 3) verbal formulation of the procedure, defined in terms of completeness of formulation, whether such appeared after indirect questioning, etc.; 4) a general score, based upon a subjective estimate by the experimenter.

Results

A. The possible range of scores by the method employed was from zero to eight. The level of the pre-test score was subtracted from the post-test score for each of 16 experimental and 16 control group patients. Using a non-parametric statistic, the Sign Test, it was found that while no significant differences existed between the conditioning scores obtained by members of the two groups at the initiation of the study, the scores of the experimental group were significantly higher (p .001) following therapy when compared with their pre-therapy scores. The control group showed no significant increase for the same period. These findings are summarized in table 1.

TABLE 1.—Conditioning Scores, Pre- and Post-Therapy

	Means	
	Pre	Post
Experimental	2.8	3.6*
Control	2.9	2.8

* Control-experimental group difference significant at .001 level.

B. The values of shock stimulus (US) necessary either to produce the first sensation of shock or to elicit a pain response also underwent some changes from initial to final tests. These show an increase in the amount of shock (voltage) necessary to elicit pain which was approximately equal for both experimental and control groups.

C. The level of shock necessary to elicit a barely perceptible sensation also increased in the same period and was approximately the same for both experimental and control groups.

D. A comparison was made of the changes in shock and pain sensitivity in individuals of both groups who showed increased (better) conditioning scores on the final test. There was a slight but statistically significant increase in both these levels evaluated by rank-order non-parametric statistics.

E. A summary analysis of the psychometric evaluation of therapeutic results including observational and rating scale methods failed to disclose significant changes in control and experimental groups.

Summary and Conclusions

Thirty-three chronic psychotics were employed as subjects in this study. They were first conditioned in a simple avoidance situation, divided into two groups, one of which was then given intensive group psychotherapy. After three months both groups were retested.

The results indicate a significantly increased level of conditionability for the experimental group and only random changes in the control

group. Faradic pain appreciation and shock sensation levels showed a generalized but insignificant increase for both groups.

It is also apparent from previous studies that cortical pathology seriously interferes with new conditioning. For the diagnostic use of the conditional reflex procedures it is therefore suggested that only the *complete absence* of conditionability is suggestive of cortical pathology while decrements in conditionability may be associated with reversible psychic factors mainly affecting attention. It is not parsimonious to conclude that conditioning deficits, based on cortical pathology, could have been alleviated by three months of psychotherapy. It is more probable that any interferences in conditioning existing in the experimental group would be those adversely affecting the perception and interpretation of the stimuli or abstracting from them. This type of phenomena has been described by Pavlov as the class of "external inhibitors", external to the neural processes directly involved in conditional reflex formation.

In clinical applications the method of conditioning as a diagnostic procedure offers a number of distinct advantages over standard psychometric techniques. It is more objective in procedure and result, it is simple and brief in administration, and requires only minimal cooperation with the subject—an important advantage when working with mute or disturbed psychotic patients.

Any further exploration of the nature of these factors adversely affecting conditioning would necessarily be based upon the assumption that this information is of more diagnostic value than that obtained from clinical observation.

BIBLIOGRAPHY

1. Gantt, W. H., and Muncie, W.: Analysis of the mental defect in chronic Korsakoff's Psychosis by means of the conditional reflex method. *Bull. Johns Hopkins Hosp., 70:* 467–487, 1942.
2. Gantt, W. H.: A method of testing cortical function and sensitivity of the skin: an aid in differentiating organic and psychogenic disturbances. *Arch. Neurol. & Psychiat., 40:* 79–85, 1938.
3. Gantt, W. H.: Impairment of the function of adaptability as measured by a simple conditioned reflex test in certain psychogenic contrasted with organic diseases. *South. M. J., 31:* 1219–1225, 1938.
4. Reese, W. G., Doss, R., and Gantt, W. H.: Autonomic responses in differential diagnosis of organic and psychogenic psychoses. *Arch. Neurol. & Psychiat. 70:* 778–793, 1953.

EXPERIENCE WITH "BGE", A NATURALLY OCCURRING INDOLE COMPOUND

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The writer is an investigator of the intermediate metabolism of tryptophan in microbes. The "psychiatric" aspect of the problem arose purely as the result of a laboratory accident.

The offending substance, temporarily called BGE, is readily isolated from mycelium of the mold, *Neurospora crassa*. It may also be found in pathological human urine. It is an extremely labile compound which we have only succeeded in stabilizing and crystallizing in recent weeks. We can prepare a synthetic BGE, apparently identical to the natural substance, by the action of hydrogen peroxide on tryptophan, as well as by the action of cortisone and ascorbic acid upon the same amino acid. Our present chemical and biological information indicates that BGE is probably beta-hydroxy "pseudo" tryptophan, i.e., simply tryptophan with a hydroxyl at the beta-carbon and indole double-bonded shifted to the indolenine position.

The compound is oxidized easily to beta-hydroxy-oxindole-alanine. Oxindole-alanine itself has only been observed in natural materials as a component of the toxin of *Amanita phalloides* (7). In the presence of acid, BGE spontaneously cyclizes to form an eseroline compound—a property it shares, as Wieland and Witkop have shown (7), with all beta-hydroxy indolenines having alanine side chains. One need not point out that eserine and eseroline compounds are notoriously toxic.

Before the nature and potential dangers of the material were known, it was handled in a rather casual way. Biochemists, unlike pharmacologists, do not normally think in terms of toxicity. There seemed no reason to suspect that BGE, present in high amounts in all fast-growing cells, should be toxic. In all likelihood, the pure, untransformed compound is not toxic. After it has cyclized to an eseroline and is then heated in base, chemical manipulation of the material gives rise to fumes which had unfortunate psychic effects upon the writer. The symptoms of a temporarily psychotic biochemist had best be described in the first person.

The first symptom which I mentioned of inhaling the fumes was, a sudden, severe headache. This lasted but a short time and was followed by a feeling of deep remoteness. I began to walk aimlessly. I did not speak. Sometimes I merely sat and stared at my laboratory notes. The simplest physical manipulations became impossibly difficult. I thought the same thought over and over, repeatedly. I felt unable to communicate with others. When forced to speak to others, including members of my own family, I felt anger or hostility. When I did speak, I felt that another person, whom I called to myself, "the Outside Talker", was speaking, rather than I. I never felt that anything was wrong with me, but that I was different from all others. I could not recognize that anything was wrong with me—but others, of course, did. My wife finally concluded that I was, upon these occasions—and each episode lasted for several days—insane, and she blamed it directly upon my work at the laboratory.

It was with a feeling of intense relief that I chanced to read a paper of Dr. Fabing (2) in which the subjective symptoms of some volunteers who had been given LSD (another member of the indole family of compounds) were described. The statements of these volunteers read very much as I had felt. I wrote Dr. Fabing and, through his kind interest in the matter, received a supply of a piperidyl compound, Frenquel. This drug, taken orally in 100 mg. tablets, reversed or blocked the symptoms of BGE intoxication within half an hour or so.

That is the psychiatric side of the story. The writer can now arise from the couch and resume a more objective approach.

The metabolism of tryptophan in animals, as has been shown by many workers, is of supreme importance (3). The end point is nicotinic acid, an indispensable vitamin. As Mehler and Knox learned in the mammalian system (4), Tatum and Beadle in the mold (6), and Stainier *et al.* in bacterial systems (5),

the first stages in the breakdown of tryptophan results from the action of hydrogen peroxide, yielding ultimately formyl-kynurenine. The latter compound, however, is obviously not the first product of peroxidation of tryptophan. Unknown intermediates occurred as Witkop postulated. BGE is the first intermediate in that chain as far as our evidence has disclosed.

Tryptophan peroxidase is the only well-studied "adaptive" enzyme in mammals (4). It is synthesized by liver in response to direct stimulation by various stressors—histamine, adrenalin, ACTH, cortisone, and tryptophan itself. In the adrenalectomized animal, only cortisone and tryptophan will induce the formation of the enzyme. The enzyme, however, requires a peroxide donor (5) in order to function. Wieland and Witkop discovered that the first stage in the peroxidation of indoles is the formation of beta-hydroxy-indolenines (7). BGE is one of these.

There are, however, other beta-hydroxy indoles and indolenines. The series of substances, beginning with leuko-adrenochrome, to adrenolutin, to adrenochrome, are all beta-hydroxy indoles. In the Stanford laboratories we have found that all indoles, including serotonin, upon peroxidation go to indolenines.

We have found BGE, or a substance which we have not yet been able to distinguish from BGE, in human carcinoma tissue in relatively high amounts. We do not find BGE in normal urine, but we do find it in the urines of persons suffering from bacterial infections and other diseases of stress, including post-surgical cases. In the urines of pregnant women, small children, and carcinoma patients, in the few hundreds of urines analyzed, we have found that little BGE is present, and that the level of indole-acetic acid is reduced at less than half of normal. In healthy subjects, we have found that ingestion of cortisone markedly decreases urinary excretion of indole-acetic acid, while BGE appears in high amounts.

As mentioned earlier, we find BGE in fast-growing cells. It is present in human wound tissue, as well as cancer cells, for example. We were prompted to test the effects of the ataraxic drugs, reserpine, chlorpromazine, and Frenquel, upon a growth system. We used the developing embryos of sea urchins as test organisms. In all three cases, we found that the ataraxic drugs inhibited growth and development. The *Rauwolffia* indole was the least powerful growth inhibitor. Frenquel was the next "metabolic poison" in strength; this substance nicely inhibits skeletalization of the embryos. Chlorpromazine was spectacularly inhibitory in extremely high dilutions.

In the absence of further proof, we assume that all of these substances interfere with tryptophan metabolism, in manners which we do not yet understand.

The moral of all this is: a) Treat all unknown indole compounds with respect. Every indole is a potential lysergic acid if it has a long enough side chain. b) Always keep in mind that there are at least two pathways to hydroxy-indoles: One, via tyrosine and adrenalin, the other via tryptophan and BGE. A third, 5-OH tryptophan to serotonin, is of obvious importance. All of these, acted upon by peroxide, may produce metabolic poisons.

BIBLIOGRAPHY

1. Ek, A. E., Kissman, H., Patrick, J. B., and Witkop, B.: *Experientia, 8:* 36, 1952.
2. Fabing, H. D.: *Science, 121:* 209, 1955.
3. Heidelberger, C., Abraham, E. P., and Lepkovsky, S.: *J. Biol. Chem., 176:* 1462, 1948.
4. Mehler, A. H., and Knox, W. E.: *J. Biol. Chem., 187:* 431, 1950.
5. Stanier, R. Y., Hyaishi, ., and Tsichida, M.: *J. Bact., 62:* 355, 1951.
6. Tatum, E. L., and Beadle, D.: *J. Biol. Chem., 180:* 1356, 1943.
7. Wieland, H., and Witkop, B.: *Ann. Chem. 543:* 171, 1940.

HOPKINS MARINE STATION
PACIFIC GROVE, CALIFORNIA

INTRAMUSCULAR BUTABARBITAL SODIUM IN THE SEDATION OF NEUROPSYCHIATRIC PATIENTS

DARWIN K. PHELPS, M.D.

Despite the advent of newer drugs such as chlorpromazine and reserpine, the barbiturates remain one of the most useful and extensively used classes of drugs in psychiatric practice. Unsurpassed as sedatives or hypnotics in neuroses, agitation states, and the psychoses characterized by manic and other violent manifestations, the barbiturates also have proved useful in narcoanalysis, electroshock therapy and as adjuncts to diagnostic and rehabilitation procedures.

In maniacal states, delirium tremens and in patients displaying greatly elevated cerebral and physical activity, larger doses of the barbiturates are usually required, and it is frequently necessary to employ hypnotic doses by one of the parenteral routes. Of these, the intramuscular injection is greatly preferred by attending personnel, especially in handling the violently disturbed patient.

In selecting a barbiturate for use in the psychiatric patient several factors should be considered. These include the likelihood of habituation or addiction, the disposition of the drug in the body, the speed and duration of action and the depth of depression produced by the drug, its effect on the heart, circulation and respiration, and the likelihood of idiosyncrasy such as hysteria, excitation and hangover.

The hazard of addiction is always present in the prolonged administration of the barbiturates, particularly the shorter-acting secobarbital, amobarbital and pentobarbital, to psychoneurotic individuals or constitutional psychopaths. A large proportion of the patients in mental institutions are advanced in age with a high incidence of cerebral arteriosclerosis and impairment in kidney and liver functions. Because of this the choice of barbiturate employed must be on a highly selective basis. Those excreted in the urine, such as phenobarbital, are usually contraindicated in impaired renal function, whereas those degraded by the liver such as amobarbital, pentobarbital and secobarbital, if used at all, should be employed with caution in disorders associated with liver damage. Damage to renal tissue appreciably extends the period of action and may result in cumulative toxicity in patients administered phenobarbital for prolonged periods even in ordinary doses, and similar effects may be expected in the prolonged administration of amobarbital, pentobarbital and secobarbital where there is liver damage. Hangover from relatively small hypnotic doses occurs frequently in neurotic aged patients, particularly when the longer-acting barbiturates are employed. Excitation, when it occurs, is most commonly observed with the shorter-acting barbiturates, especially when there is a disturbance in cerebral circulation. The use of the currently available barbiturates for parenteral use is therefore subject to certain limitations in neuropsychiatric practice.

There recently has been made available in a dosage form highly suitable for intramuscular use a solution of Butabarbital Sodium,[1] an intermediate acting barbiturate with a wide margin of safety, which has been used extensively *per os* (1, 2) but to our knowledge never previously employed by injection. The drug is presented in a special non-irritating vehicle, consisting of polyethylene glycol 40% and benzyl alcohol 2%, which keeps pain at the site of injection to a minimum.

This drug appeared to offer certain advantages in the sedation of the elderly, debilitated or arteriosclerotic neuropsychiatric patient over those barbiturates previously available for parenteral use. We submit herewith a report on our clinical experience with this drug at the Columbus State Hospital, Columbus, Ohio.

Material and Methods

The subjects consisted of 36 severely disturbed inmates with a variety of mental diseases requiring sedatives and hypnotics. The diagnoses included schizophrenia of the

[1] Bubartal Sodium injection (125 mg. per cc.), Columbus Pharmacal Co., Columbus, Ohio.

hebephrenic, catatonic, and paranoid types, chronic brain syndrome and psychoses associated with cerebral arteriosclerosis, manic depressive psychoses, acute brain syndrome due to alcoholism, and psychosis with syphilitic meningoencephalitis. Three of these cases were complicated by diabetes and cellulitis and three by pneumonia. The average patient's age was 53 years, with a range of 22 to 80 years, and an almost equal distribution in sex. Two patients were receiving electroshock therapy during the study period; three were receiving daily insulin injections; and six were receiving antibiotics. Other medications administered during the clinical period were digitalis (1 case), demerol (1 case), and heparin (1 case).

A total of 95 intramuscular injections were made in doses of 0.5 cc. (3), 1.0 cc. (19), 2.0 cc. (65), and 3.0 cc. (8). Dosage varies from 0.5 cc. (65 mg.) on alternate days in a mildly disturbed patient to 9 cc. (1.125 gm. in divided doses) over a 24-hour period in an extremely violent patient. For the most part a dosage of 2 cc. (250 mg.) daily was employed. The period of administration during the study varied from 1 day to 3 weeks. The patients were observed closely by nurses and attendants and checked periodically by the medical officer during the course of the study. Each patient was closely observed for the appearance of toxic or side effects, idiosyncrasy, restlessness, excitement, delirium, and hangover following each injection. The sites of injection were carefully checked for evidence of tissue damage, poor absorption, pain, or induration. Routine checks for blood, kidney or liver damage, respiratory and cardiac depression were also made. The onset, duration and degree of sedation were noted following each injection.

Results and Comments

Highly satisfactory sedation or hypnosis was obtained in nearly every case in which this drug was administered. Doses of 0.5 to 1.0 cc. (usually 1 cc.) produced adequate sedation. For hypnosis, doses of 1.0 to 3.0 cc. (usually 2 cc.) were required. The effects of the drug were generally observable within 10 to 20 minutes and persisted from 3 to 8 hours, usually about 6 hours.

An injection of 2 cc. failed to produce the desired effect in a severely disturbed schizophrenic (catatonic type), but another 2 cc. injection administered 6 hours later produced hypnosis of 7 hours duration. In one case of a schizophrenic paranoid suffering from biliary colic, it was necessary to increase the dose to 2 cc. for sedation and to 3.0 cc. for hypnosis. Pain was so severe in this patient that meperidine had to be administered concurrently. An acutely disturbed patient with acute brain syndrome due to alcoholic intoxication required three 2-cc. injections in the course of a single day, which produced satisfactory hypnosis with no apparent ill effects. In an agitated schizophrenic, chlorpromazine had to be discontinued because of the development of pneumonia. Butabarbital Sodium injection was immediately substituted, and the agitation was successfully controlled. Recovery from the pneumonia was uneventful. Two other patients with pneumonia were also administered the drug to control disturbance. No significant depression in respiration was observed in any of these cases. All three of these patients were on antibiotic therapy as well.

In three cases a direct comparison could be made between the effects of amobarbital sodium and this preparation administered intramuscularly. In two of these cases the latter produced hypnosis where amobarbital in approximately the same dose had failed. In the third case the two drugs were equally effective in producing the desired sedation.

No toxic side effects, muscle irritation, tissue, blood, liver or kidney damage were observed. No complaint of pain on injection was registered. No adverse effects from the medication were observed in patients who received insulin, antibiotics, digitalis, heparin or electroshock therapy concurrently. Accumulation of the drug was not apparent even in diabetics with impaired liver function. Despite the fact that many of these patients were aged or senile, restlessness, excitement, or delirium or other forms of idiosyncrasy were not produced by the injections of Butabarbital Sodium.

Summary and Conclusions

Thirty-two severely disturbed inmates of a State Mental Hospital were administered a new barbiturate, Butabarbital Sodium,

injectable by the intramuscular route as a sedative-hypnotic. The medication appears to be notably safe and effective in controlling these patients and is a useful addition to the hypnotic drugs currently used in psychiatric practice.

BIBLIOGRAPHY

1. Dripps, R. D.: *J. A. M. A., 139:* 148, 1949.
2. *New and Nonofficial Remedies*, 1956, page 288.

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BOOK REVIEWS

Wattenberg, William W. THE ADOLESCENT YEARS. New York: Harcourt, Brace, and Co., Pp. 510. 1955.

Dr. Wattenberg, Professor of Educational Psychology at Wayne University, has written an unusually diligent and broadly perspective work on the psychology of adolescence, as viewed in the United States. The volume offers manifold points of view and is rich in factual data. Although, as usual in America, constitutional aspects are given short shrift, Wattenberg makes at least an attempt to consider the importance of physique. Other formative influences discussed include: parents and family, broken homes, peer groups, school, and neighborhood. Another major part concerns problem areas: Sex (including an excellent section on sex information and juvenile male sex offenders), social relationships, ideals, concepts of self, power and mastery, vocational choices, and personality troubles. The last and perhaps most successful part deals with "practical implications" for adults, that is, parents, teachers, counsellors, group leaders, ministers, and other community agencies.

While all sections have been strengthened by excellent case examples, the volume also contains some unnecessary and not always very tasteful illustrations. The European reader is reminded that Americans are nurtured with a strong diet of magazines, and it may have been believed that illustrations would help sell the book.

Wattenberg's text reflects the current value system of American society, the heavy emphasis on adjustment and conformity, the (partially unconsious) puritanical morality, and a kind of cultural isolationism. The author seems to recognize (without always saying so) the American personality ideal of adjustment and conformity at any price, which is understandable historically but, as Erich Fromm has shown, is not without danger culturally and politically. (Examples may be found on pages 269–270, 301–302, 318–319, 466.) The independent and often somewhat introversive personality is not held in very high esteem in the United States; it almost seems as if it were feared. (An opposite example would be Swiss federalism.)

The chapter on sex is sober and broad in scope but tends to cling a little to the superficial. There is little discussion of the puritanical basis of northamerican morality and its inadequacy in the face of the practices of American society, or of the relativity of American (or any other) morality and the educational problems it produces. The ruling American moral code is uncritically accepted. (Perhaps that is a result of an adjustment ideology.) The small section on premarital intercourse has an almost tragicomic effect on the European reader.

The book contains several interesting examples of American autism and isolation, a kind of "provincialism" as Gordon W. Allport has recently termed it. For instance, Wattenberg (P. 61) seems to believe that the first volume on preadolescence was published in 1951 in the United States. The fact is that H. Vorwahl had already published his psychology of preadolescence in Germany in 1929. Similarly, the author seems unaware (P. 74) of the existence of coeducational youth organizations which from their beginnings in Austria spread to Germany and all of Scandinavia. It seems as if Europe and America are today indeed two separate worlds.

Perhaps Wattenberg's comment (P. 483) that the United States has "better prepared teachers . . . than anywhere else in the world" can be ascribed to a certain local pride and patriotism. Why should a country whose teachers are underpaid, whose elementary schools are in an increasing state of decay, and some of whose university professors have an educational background less than that required even in the smallest European state, why should this country have the best educational system?

Inspite (or perhaps just because) of these minor reflections of Americanism, Wattenberg's text is most instructive and can be well

recommended to anyone interested in adolescent psychology.

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Greenblatt, Milton, M.D.; York, Richard H., Ph.D.; Brown, Esther Lucile, Ph.D.; in collaboration with *Hyde, Robert W., M.D.* FROM CUSTODIAL TO THERAPEUTIC PATIENT CARE IN MENTAL HOSPITALS. (New York: Russell Sage Foundation, 1955. Pp. 497. $5.00)

This book is the report of a project developed from a set of happy circumstances. A foundation discovers a psychopathic hospital where the director is interested in the behavioral as well as the medical sciences. Two large public mental hospitals within commuting distance associated themselves with the psychopathic in this project.

In the introduction, Dr. Esther Lucile Brown, Director of Studies in the Professions, Russel Sage Foundation, discusses the aims and purposes of this social study. The first working hypothesis is that the mental hospital, like the general hospital, shall use all available forms of treatment for their patients to the end that maximum improvement may result. The second premise is that this requires a planned and systematic use of the whole environment. The third, and final, working hypothesis is that the use of the total environment shall be according to the concepts and methods of research developed by the behavioral sciences.

In Part One, Dr. Milton Greenblatt, Psychiatrist in Charge of Research Laboratories, Boston Psychopathic Hospital, describes the role that his institution played in this study. With skill he traces the development of this hospital from its beginnings in 1912 until the start of this project in 1952. Over the years this institution seemingly had been preparing itself for accepting the responsibility that was laid upon it by the foundation's grant.

Under the guidance of the coordinating committee the staff and ward personnel take a new look at their ward procedures. They move rapidly in reducing restraints for the patients, increasing visiting hours for the relatives, developing self-government for the patients, utilizing volunteers in increasing numbers, and training their employees at all levels to interact more effectively with the patients.

The full import of all the changes made can be grasped only by reading the book. It is not exaggerating to say that this hospital staff reached an all-time-high in their utilization of the total environment during the period of this project.

Dr. Richard H. York, a clinical psychologist on the staff of the Boston Psychopathic Hospital, the coordinator of the study, does an excellent job in collaborating with various staff members of the Bedford Veterans Administration Hospital in reporting this phase of the work.

In the buildings that were set aside for the study, certain wards were designated as controls. The enthusiasm generated was so great that it spread to the control wards, with the result that they had to be abandoned as such. Gradually the doors came off the seclusion rooms. Two by two, the disturbed patients were integrated into the social activities that were set up on the wards. In a short while patients who had not been off the ward for months and years were adjusting satisfactorily in the various occupational therapy shops and recreational activities about the institution. The small hard core of patients who did not respond to these environmental changes were placed in group therapy. Patients who had been mute and withdrawn for years were gradually drawn out of their shells. This permissive atmosphere spread throughout the hospital. The complete story of all the changes makes fascinating reading.

Dr. York is also the reporter for the project as it relates itself to the chronic wards at the Metropolitan State Hospital. One is pleased but not astonished at the metamorphoses at the Boston Psychopathic Hospital and the Bedford Veterans Administration Facility. With their resources it is understandable that such things could be done; but in a State Hospital the attempt is remarkable, and the fact that certain things were done calls for the highest praise. A section of the student affiliate nurses and a selected number of the regular ward employees spearheaded the ward

socialization programs. One will have to read this portion carefully to convince himself that a State Hospital, with its chronic shortages, can literally lift itself by its own bootstraps.

For those who believe that progress is a continuous ascending affair, the conclusions written by Drs. Brown and Greenblatt is truly revealing. They describe the "moral treatment" that existed in our mental hospitals a hundred years ago. It is their considered opinion that our present efforts to improve the social atmosphere of our wards is largely an attempt to reach the levels that existed over a century ago. They also feel that with the present development of our behavioral sciences we shall be able to recapture the ground that has been lost and go on to new triumphs in the care and treatment of our mental patients.

The bibliography compiled by Frederick L. Wells, Ph. D., is a complete one and rounds out a most stimulating study.

This book belongs in the library of every mental hospital. It is a challenge to the psychiatric administrator. For those who read this book seriously it may provide stimulation and a desire to move in this direction even though many barriers stand in the way.

CHARLES C. GRAVES, M.D.

BOOK NOTES

Siegel, Sidney: NONPARAMETRIC STATISTICS FOR THE BEHAVIORAL SCIENCES. (New York: McGraw Hill Book Co., Inc., Pp. 312 +xvii, 1956, $6.50.)

Important in the development of statistical analysis of data during the past decade is the emphasis of nonparametric tests of significance, i.e., statistical tests which are relatively free of assumptions concerning the distribution of the population from which the sample was drawn. In contrast to the physical scientist who frequently is able to order his data on interval or ratio scales, the social scientist is more usually restricted to either nominal or ordinal scales. Analysis of such data may more readily and justifiably be analyzed by nonparametric than by the usual parametric tests.

Dr. Siegel's work appears to be the first unified presentation of this field. He has accomplished the difficult task of providing not only an exposition but also a source for future reference. The content is logically divided into discussions of alternative research designs and their appropriate tests. Of the nine chapters, three are devoted to an essential discussion of statistical tests, their use and evaluation in research. The titles of some of the remaining chapters, e.g., "The One-Sample Case," "The Case of Two Related Samples," and "The Case of k Independent Samples" furnish an idea of the organization and utility of the book. An appendix of twenty-one tables contains not only the usual square roots and chi-squares, but also several tables relatively unaccessible elsewhere which will be found of definite value.

This volume is unhesitatingly recommended to all social scientists who recognize a need for refined procedures of statistical inference to meet the unique requirements of their field.

Michal-Smith, H.: THE MENTALLY RETARDED PATIENT. Philadelphia: J. B. Lippincott Co., Pp. 203, 1956, $4.00.

The mental development of children and the care of the retarded child as well as of the adult mentally deficient person have been sugjects of some study for a great many years but this whole field as large and important as it is has not commanded the interest and attention it deserves; a situation probably due in large measure to the attitude of therapeutic hopelessness that has been accumulating for generations regarding the mentally deficient.

In this book Dr. Michal-Smith a clinical psychologist has presented an interesting study of the problems concerned in the treatment of the mentally retarded individual, the role of the physician and the management of the patient's family.

Some of the special topics presented in the nine chapters are concerned with the results of organic brain impairment, with the classification and description of mental retardation, with attitudes toward cause and prevention, with family problems and with education, and vocational prognosis. These and other factors are covered concisely and informatively. As

important features to aid those working with these problems, there is a bibliography for professional workers, a selected reading list of books, articles and pamphlets for laymen and a list of state and private institutions caring for the mentally retarded.

It is hoped that this useful little book will not only serve clinical purposes but will stimulate research in this area where the need for it is urgent.

McIntosh, R. and Hare, C. C. (Editors) NEUROLOGY AND PSYCHIATRY IN CHILDHOOD: PROCEEDINGS OF THE ASSOCIATION FOR RESEARCH IN NERVOUS AND MENTAL DISEASE (Vol. XXXIV). Baltimore: The Williams and Wilkins Company, Pp. 504, 63 illustrations and 21 tables, 1954, $11.00.

These proceedings of the meeting of the Association for Research in Nervous and Mental Diseases held in December, 1954 contain a large number of articles of particular interest to pediatricians. Dr. Rustin McIntosh, Professor of Pediatrics at Columbia University, was chairman of this meeting and the members of the Commission were all outstanding contributors in the field of nervous and mental disorders of children.

The papers dealing with neurologic conditions are presented in four parts: the first part consists of four articles covering the infections of the central nervous system. The second part, composed of six articles, discusses the developmental and traumatic problems of infancy and childhood. The third part contains two papers on functional and degenerative disturbances including cerebral atrophies, encephalomalacias and myasthenia gravis, and part four presents roentgenographic features and problems.

The papers presenting psychiatric conditions are grouped in the fifth part of the text in five contributions, and in a sixth part which consists of a symposium of three contributions on juvenile schizophrenia.

In all there are twenty-two chapters and thirty-nine contributors. Discussions follow the formal presentations. By and large the ground has been well covered and many problems in this field have been illuminated by recent research, although as should be expected, there are still many that remain unsolved, particularly in the psychiatric areas.

This book is a milestone in progress and should be read by all neurologists, psychiatrists and pediatricians and some parts of it by those concerned with the education of handicapped children.

Bennett, A. E., Hargrove, E. A. and Engle B. (with Contributing Authors): THE PRACTICE OF PSYCHIATRY IN GENERAL HOSPITALS. Berkeley and Los Angeles: University of California Press, Pp. 178, 1956, $4.00.

In recent years there has been an ever increasing demand for general hospitals to develop the properly equipped departments to afford prompt attention and care for patients with mental disorders and to deal efficiently with acute emergency situations.

This book outlines adequately the dire need for the integration of psychiatry into general medicine and for general practitioners to assume some of the responsibility of treating mental patients. Throughout the book the authors, all of whom have had considerable experience in creating psychiatric units of various types offer the information necessary and pertinent to the development of general hospital facilities.

The ten chapters contain detailed advice on the staffing of psychiatric units including nursing, occupational therapy, psychology and social service personnel and organization, various training programs, administrative problems and procedures, architectural considerations, the problem of psychiatric referral, medicolegal aspects, health insurance, the day hospital idea and an account of special therapies. The reader will find the answer to many a problem concerned with psychiatric care and needs.

The book serves an immediate need and is also forward looking into the possible future developments in this area. It should be read with profit by all concerned with psychiatric matters and with the present high rate of mental disorder almost everyone should be concerned. The authors and publishers have rendered us a valuable service.

BOOKS RECEIVED FOR REVIEW

February, 1957

ALEXANDER, FRANZ AND STAUB, HUGO. *The Criminal, the Judge and the Public.* The Free Press, Glencoe, Ill.

AMBROSE, GORDON. *Hypnotherapy with Children.* Staples Press, Ltd., London, England.

American Psychiatric Association. *A Psychiatric Glossary.* American Psychiatric Association, Washington, D. C.

Association for Research in Nervous and Mental Disease. *The Neurologic and Psychiatric Aspects of the Disorders of Aging.* Proceedings of the Association, December 9 and 10, 1955, New York, N. Y. The Williams and Wilkins Co., Baltimore, Maryland.

GOMIRATO, G. AND GAMNA, G. *Die Verwirrtheitszustande.* S. Karger, A. G., Basel, Switzerland.

KOLLE, KURT. *Der Wahnkranke Im Lichte Alter Und Neuer Psychopathologie.* Georg Thieme, Stuttgart, Germany.

MACALPINE, IDA AND HUNTER, RICHARD A. *Schizophrenia, 1677.* A Psychiatric Study of an Illustrated Autobiographical Record of Demoniacal Possession. William Dawson & Sons, Ltd., London, England.

PECK, SAMUEL M. AND PALITZ, LAURENCE L. Practical Dermatology. McGraw-Hill Book Co., Inc., New York, N. Y.

ROHDE, AMANDA R. The Sentence Completion Method. The Ronald Press Co., New York, N. Y.

STACEY, CHALMERS L. AND DEMARTINO, MANFRED F. (Editors) *Counseling and Psychotherapy with the Mentally Retarded.* The Free Press, Glencoe, Ill.

NOTES AND NEWS

CHANGES IN JOURNAL OF INDIVIDUAL PSYCHOLOGY

The Journal of Individual Psychology, a publication of the American Society of Adlerian Psychology, Inc., formerly known as The American Journal of Individual Psychology, has broadened its editorial policy According to the new policy, the journal is seen as the medium of expression of those in psychology and related fields who are interested in a holistic, teleological, phenomenological, and socially oriented approach, based on the assumptions of an active creative self, an open dynamic system of motivation, and an innate potentiality for social living.

The journal invites theoretical and research papers, and clinical and other practical contributions, as well as informal notes and letters, which fall within the scope indicatet above.

The May issue, the first under the new policy, contains papers by Hadley Cantril, Albert Ellis, Ruth Hartley, Clark Moustakas, and Edmund Sinnott, among others, and a heretofore untranslated paper by Alfred Adler, dated 1937, the year of his death.

Requests for sample copies and all other communications are to be addressed to Dr. H. L. Ansbacher, Editor, University of Vermont, Burlington, Vermont.

NEW MENTAL HEALTH PLAN

A mental health plan in Indiana, sparked by a Veterans Administration psychologist, is tackling one of the most critical problems of patients who are ready to leave the hospital.

The plan is for all agencies and hospitals in the State, concerned with rehabilitating the mentally handicapped, to coordinate their work so that a patient at the time of discharge will have these guidance and rehabilitation facilities at his call.

The cooperative program, aimed at reducing the return to hospitals of one out of every two released mental patients, was developed from a historic three-day meeting last year, attended by 250 Indiana officials from every agency and institution in the State that deals with the mentally ill.

The VA psychologist who suggested the institute is Durand F. Jacobs, PhD., chief of vocational counseling service at the Marion, Ind., VA hospital.

MENNINGER FOUNDATION HONORS FIRST ALFRED P. SLOAN VISITING PROFESSOR IN PSYCHIATRY

On March 17, in an important development in psychiatric education, Dr. Earl D. Bond became The Menninger Foundation's first Alfred P. Sloan visiting professor in psychiatry. He planned to remain in Topeka for several weeks, spending most of his time meeting informally with individuals and small groups of Fellows in the Menninger School of Psychiatry.

The visiting professorships were established by a grant from the Alfred P. Sloan Foundation. Their purpose is to bring to Topeka, for varying periods of time, men and women of outstanding achievement in psychiatry, in order to enrich the professional education of the nearly 150 physicians studying in the Menninger School of Psychiatry.

In announcing the appointment of the first Sloan professor, Dr. Karl Menninger said, "It is from contact with great individuals and great teachers that the young student is inspired toward great purposes and lofty ideals. I can imagine no one more suited to give this kind of leadership than Doctor Bond. He combines extraordinary breadth and clarity of thinking with an unusual capacity for inspiring others. He will bring to his position a sum of experience which can hardly be matched by any other living American psychiatrist."

Doctor Bond, a former president of the American Psychiatric Association, is now in his 49th year in the profession. During the past 44 years he has been actively associated with Philadelphia's Pennsylvania Hospital, for the past 21 years as its physician-in-chief and as director of training for the University of Pennsylvania Graduate School of Medicine.

Doctor Bond is to give several lectures to

Fellows in the Menninger School of Psychiatry, including a review of the history of American psychiatry in which he has played so prominent a part. In accordance with the general plan of the Sloan professorships, approximately half his time is available to him for the pursuit of his own research and clinical interests.

SHERRINGTON CENTENARY

This is the centenary year of the birth of Sir Charles Scott Sherrington, O.M., a founder and main architect of the physiology of the nervous system. The Royal Society of Medicine, wishing to pay tribute to his life and work, proposes to raise a fund towards a Sherrington Lecture, for the furtherance of knowledge on the nervous system, to be delivered from time to time in the Society's rooms in London.

It is felt that many will wish to contribute: both those who were his friends, pupils and colleagues, and those, more numerous, who, as patients, doctors and scientists, have benefited indirectly from his work.

We wish to take this opportunity to commend the endeavour of the Royal Society of Medicine to establish this memorial to a great pioneer in scientific medicine.

Donations should be made payable to the Secretary, The Royal Society of Medicine, 1 Wimpole Street, London, W. 1, and cheques crossed 'Sherrington Memorial'.

Sir Russell Brain, Bart., D.M., *President, Royal College of Physicians*

Sir Lindor Brown, C.B.E., F.R.S., *Foreign Secretary, Physiological Society*

Professor John Fulton, M.D., *Stirling Professor of the History of Medicine, Yale University*

Mr. W. R. Henderson, O.B.E., F.R.C.S., *President, Society of British Neurological Surgeons*

Professor Sir Cyril Hinshelwood, M.A., D.Sc., F.R.S., *President of the Royal Society*

Professor E. G. T. Liddell, F.R.S., *Waynflete Professor of Physiology, University of Oxford*

Mr. D. W. C. Northfield, M.S., F.R.C.S. *President, Section of Neurology, Royal Society of Medicine*

Sir Clement Price Thomas, K.C.V.O., F.R.C.S., *President, Royal Society of Medicine*

Sir Charles Symonds, K.B.E., C.B., D.M., *President, Association of British Neurologists*

Sir Francis Walshe, M.D., F.R.S., *Chairman, Sherrington Memorial Committee, Royal Society of Medicine*

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THE INFLUENCE OF SEIZURE PERCEPTION ON SEIZURE OCCURRENCE[1]

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In investigating the correlation between neural and behavioral events, seizure phenomena occupy a unique position. They constitute a sequence of observable behaviors with known correlates in the electrical activity of the cortex which may on occasion be induced, terminated, or otherwise altered by manipulations performed upon the brain. To the extent that these behaviors fulfill the general laws of behavior theory, the relation of these laws to neural action may be supposed.

Skinner (7, p. 210) has pointed out that when a given response exists at some low strength, the probability of occurrence of that response may be raised by the occurrence of a stimulus of similar formal characteristics. He refers to this as echoic behavior. If seizures are considered as behavioral events with known neural correlates, demonstration of such echoic influences on seizure occurrence will help elucidate further the concept of seizures as providing links between brain and behavior theory. If the perception of seizures influences their incidence, there should be a relationship between the typical frequency with which seizures occur within a group and the frequency of seizures for any member of that group when the group seizure frequency is calculated independently of the seizure frequency of the member concerned. When the seizure frequency of part of a group increases for known reasons, the seizure frequency of the remainder of the group for whom these reasons do not apply should also increase.

PROCEDURES AND RESULTS

To test the hypothesis that individual seizure incidences are influenced by the incidence of seizures in the group to which the individual belongs, the seizure incidence records for September, 1956, of four adult female wards at the New Castle State Hospital were gathered, and the total frequency of seizures exhibited by each patient during that month was ascertained. Patients are assigned to these wards roughly on the basis of how disturbed they seem, and the wards differ among themselves in a corresponding fashion with respect to the permissiveness of the atmosphere which they maintain. On all wards, there is a concerted effort to involve patients in as many hospital activities as possible, and medication policies do not vary from one ward to another. Since a correlation between disturbance and seizure occurrence has often been asserted (4, p. 71), the rank order correlation, *tau*, between the median seizure frequency for each ward and the relative ranking of each ward in terms of disturbance and permissiveness was obtained. The *tau* obtained between disturbance and seizure frequency was $-.17$ and that obtained between permissiveness and seizure frequency was $+.17$. Neither of these coefficients is significant. These data and the number of persons in each ward are presented in table 1.

In order to determine whether the individual seizure incidences were more closely related to the median seizure frequencies of their own groups than to those of the other wards, an infinite sampling technique was adopted. Samples of five patients were withdrawn from each ward by means of a table of random numbers, and new medians were calculated for the seizure incidences of the remaining patients. The absolute deviation of each patient in these samples from the new medians of the remainder of the groups was calculated, and these deviations were summed to provide a total deviation score for the sample from its own ward and from each of the other wards. This resulted in a total of four deviation scores of these samples from their own wards, and a total of twelve deviation scores of these samples from the remainder medians of the other wards. The mean of the four deviation scores of the samples from their own groups was then compared with the mean of the twelve devia-

[1] This paper was presented at the meeting of the Midwestern Psychological Association in Chicago May 2–4, 1957.

TABLE 1.—Size, Median Seizure Frequency, and Rank of Four Adult Female Wards on Dimensions of Decreasing Disturbance and Permissiveness

Ward	N	Median Seizure Frequency	Degree of Disturbance	Degree of Permissiveness
1	23	4	4	1
2	34	1	3	2
3	35	1	2	3
4	29	2	1	4

TABLE 2.—Mean Deviation of Subsamples from the Medians of the Remainder on Their Own Wards and the Remainder on the Other Wards in each Successive Sampling

Sampling	Mean Deviations	
	Own group	Other groups
1	9.5	12.9
2	12.3	15.4
3	14.5	15.5
4	11.0	13.5
5	10.6	15.8

TABLE 3.—Mean Deviation of Subsamples Taken from Groups of Random Numbers from the Median of the Remaining Numbers in Their Own Group and from the Remaining Numbers in the Other Groups in Each Successive Sampling

Sampling	Mean Deviations	
	Own group	Other groups
1	137.4	133.8
2	131.2	135.6
3	120.2	118.8
4	129.1	121.5
5	142.2	126.6

TABLE 4.—Number of Experimental and Non-experimental Patients Listed by Diagnosis

Diagnosis	Experimental	Non-experimental
Focal convulsive disorder	16	7
Idiopathic convulsive disorder	9	2
Mixed convulsive disorder	1	1
Total	26	10

tion scores of the samples from the other groups on the hypothesis that the deviations of the samples from the medians of their own groups should be less than their deviations from the medians of the other groups. The samples were then returned to their respective groups, and new samples were drawn. This procedure was repeated five times as, with an assumed probability of .5 for either mean being less than the other, this was the least number of drawings which would yield a probability of .05 or less. These means for each sampling are presented in table 2. In every instance, the deviation from the median of the group from which the samples were drawn is less than the deviations of the samples from the medians of the other groups.

As a crosscheck, the foregoing procedures were repeated with four samples of 25 numbers taken from the Rand Corporation table of random numbers as given in Dixon and Massey (1). Table 3 shows that in only one instance is the mean deviation from own group remainder median less than the deviation from the median of the other groups. The results, therefore, do not appear to be a statistical artifact. As a further check on the role of disturbance in the group contributing to the group climate of seizure incidence, ward records were checked for instances of disturbance which might contribute to the development of higher seizure frequencies. No such instances were found. Individual seizure incidences seem to be influenced by the typical seizure frequency of the group to which the individual belongs, and this influence does not seem to arise from common patterns of disturbance.

In order to determine whether changes in the seizure incidence of part of a group will affect the seizure incidence of the remainder of the group, the records of the hospital were searched and an instance was found in which 26 female patients were used in a test of a new anti-convulsant drug.[2] Ten wardmates were not used in this study but remained resident on the same ward. The diagnosis of both groups is summarized in table 4.

The procedure utilized in this study consisted of 1) determining the weekly seizure rate under regular medication, 2) determining the weekly seizure rate when the new drug was added to the regular medication, 3) determining the seizure rate during a week in

[2] The writer is grateful to Dr. Jack M. Mosier for making these data available.

TABLE 5.—DIFFERENCES IN TOTAL WEEKLY SEIZURE INCIDENCE IN AN EXPERIMENTAL GROUP SUCCESSIVELY ON REGULAR MEDICATION AND AN EXPERIMENTAL DRUG, ON EXPERIMENTAL DRUG ALONE, AND ON REGULAR MEDICATION ALONE

	Exp. Drug	Reg. Med.
Reg. Med. + Exp. Drug	+458.4*	−6.8
Exp. Drug		−475.2*

* p is less than .001.

TABLE 6.—DIFFERENCES IN TOTAL WEEKLY SEIZURE INCIDENCE IN A NON-EXPERIMENTAL GROUP RESIDENT ON THE SAME WARD AS AN EXPERIMENTAL GROUP SUCCESSIVELY ON REGULAR MEDICATION AND EXPERIMENTAL DRUG, EXPERIMENTAL DRUG ALONE, AND REGULAR MEDICATION ALONE

	Exp. Drug	Reg. Med.
Reg. Med. + Exp. Drug	+29.9*	+3.5
Exp. Drug		−26.4†

* p is .05.
† p is .01.

which only the new drug was administered, and 4) determining the weekly seizure rate when the patients were returned to their regular medication. The period in which the initial weekly seizure rate was determined bears no significance to the present study and is not considered here. The seizure rates in the periods in which the experimental drug was administered in addition to regular medication, during the week on the experimental drug alone, and upon the resumption of regular medication were compared with one another by means of Fisher's randomization test for matched pairs (6) for both the experimental and non-experimental groups. Table 5 shows that there was a marked increase in seizures in the experimental group during the period in which the experimental drug alone was employed and a return to previous seizure levels when regular medication was resumed. Table 6 shows that the group not involved in this study but resident on the same ward also showed an increase in seizure frequency when the experimental group did and a return to previous seizure levels when the experimental group returned. These data suggest that the frequency with which seizures occur within any individual is a function of the frequency with which seizures occur in the environment about him.

DISCUSSION

Consideration of both of the above studies not only demonstrates group influences on seizure production, but also suggests that group climates of disturbance are not sufficient to account for the results obtained. The likely possibility seems to be the occurrence of seizures in the immediate environment, which strongly underlines the role of echoic influences on seizure production. While the work of Janet (3) on suggestibility might suggest such influences occurring within the realm of functional seizures, the present study demonstrates their operation with regard to seizure phenomena with known organic correlates. This further suggests the grounding of the Skinnerian concept of echoic behavior in nervous system processes.

Since no two seizures are exactly alike, however, an account of these data in terms of echoic processes requires a mediating response through which the strengthening takes place. Such a mediating response may be provided by the concept, *seizure*, which the individual may apply to certain behaviors of his own and certain behaviors in others. Many studies (2, 5) have shown that thought processes may exhibit themselves in subtle changes in muscle tonus and potentials. In the case of seizure prone individuals, the occurrence of the verbal concept, *seizure*, may be accompanied by subliminal bodily changes characteristic of their own seizure behavior. These changes then make more probable the additional responses which constitute a clinically recognizable seizure.

From an epidemiological point of view, this study suggests that the occurrence of seizures may be facilitated in susceptible individuals by introducing them into an environment in which seizures occur. A group immunity effect may exist for seizure phenomena which arises from their rarity in the general population. In populations of epileptics, as better control is attained over seizure occurrence, echoic factors should also contribute in reducing over-all seizure rates.

SUMMARY

Analysis of the relationship between the incidence of seizures in individual epileptic patients and the typical frequency of seizures

on their own and other wards suggests group influences on individual seizure occurrence. When the seizure frequencies in part of a group increase for known reasons, the frequencies in the remainder of the group also increase. Disturbance does not seem to play a role in this relationship.

These phenomena are related to Skinner's concept of echoic behavior. It is hypothesized that observing seizure activity in other patients brings to higher strength the word, *seizure*, which in turn is accompanied by subliminal responses characteristic of the individual's own seizure behavior. From an epidemiological point of view, it is hypothesized that many individuals who might otherwise have seizures fail to exhibit them because of their statistical rarity in the general population.

REFERENCES

1. Dixon, W. J. and F. J. Massey, Jr. *Introduction to statistical analysis, 1st ed.* New York: McGraw-Hill, 1951.
2. Jacobson, E. Electrophysiology of mental activities. *Amer. J. Psychol.*, 1932, 44, 677–694.
3. Janet, P. *The major symptoms of hysteria, 2d ed.* New York: Macmillan, 1920.
4. Lennox, W. G. *Science and seizures, 2d ed.* New York: Harper, 1946.
5. Max, L. W. Experimental study of the motor theory of consciousness. IV. Action-current responses in the deaf during awakening, kinaesthetic imagery and abstract thinking. *J. comp. Psychol.*, 1937, 24, 301–344.
6. Moses, L. E. Non-parametric statistics for psychological research. *Psychol. Bull.*, 1952, 49, 120–143.
7. Skinner, B. F. *Science and human behavior.* New York: Macmillan, 1953.

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REMOVAL OF CEREBRAL ANGIOMA WITH CARDIAC MONITOR[1]

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The purpose of this paper is to evaluate the efficiency of constant cardiac monitor during cerebral surgery, where electrocautery and electric cutting current are used. It is an obvious advantage in any surgical procedure to know the cardiac status at all times. A precision instrument designed for this purpose would be a source of ease both for the surgeon and the anesthetist. The instrument used in this study is the "Vector-View" which furnishes the conventional electrocardiographic records on tape as well as on the oscilloscope under four times enlargement. Also, this unit is a system, complete in all details, for the study of vectorcardiographic "loops" in the frontal, sagittal and horizontal planes. In addition there is the triggering of an automatic electrical shocking apparatus for cardiac standstill after the method described by Zoll (6). This surgical problem has been thoroughly discussed by Dr. Max Thorek (4).

Case History and Surgical Procedure

A 7-year-old female child was examined and found to suffer from cerebral palsy (2–3), mental defect and epilepsy. A history of parturition revealed that delivery was precipitous, and the child suffered from a Jacksonian attack involving the left hand just a few days after birth. Ten months later it was found that the child was suffering with ambliopia of the left eye, over which a film was developing. At that time she had no hair and no teeth. At the tenth month of her age the child received regular craniospinal manipulations by an Osteopathic Physician which caused some improvement in both eyesight, development of hair and teeth. These statements were made by the patient's parents who felt that these manipulations were of some definite value to the child.

Upon examination it was found that this child was able to move her left limbs better than her right, yet the seizures involved the left limbs more than the right. At onset, these seizures occurred every few hours, but there was a decrease in their frequency after the osteopathic manipulations. At the present time epileptic attacks occur once or twice a week. This child shows a typical picture of the complicated cerebral-spastic. She drools, shows strabismus in left eye, has stertorous breathing, and experiences some difficulty in swallowing. The skull is asymmetrical, and the child is mentally defective. The spasticity involves all four limbs. The patient can make some sounds, seems to be able to recognize her parents, and reacts favorably to music; but otherwise there is no other subjective or objective evidence of intelligence.

Pneumoencephalography was attempted by a university neurosurgical clinic with no success. Electroencephalography carried out in 1956 showed a generalized dysrhythmia. Skull x-ray shows a right-sided increase in the vascular markings in the frontotemporal region running down to the pterion.

Surgical procedure. A right-sided craniotomy was carried out. A three-inch incision centering on the pterion was brought down to bone in the coronal plane. The skull was entered by drill, burr and rongour, and the opening was enlarged to the size of a half-dollar. The dura was thickened and the meningeal vessels were varicosed. These vessels were cauterized, and at this time it was noted that the brain did not pulsate. The dura was opened in a stellate manner, and a venous angioma came into view. This angioma was composed of two greatly widened vessels, almost in the nature of sinuses, running together at the sylvian fissure into a central venous sinus. The brain in this whole area was blue, cyanosed, showed diminished pulsation and diminished flow of cerebral spinal fluid. The vessels were cauterized to the depths of the cortex. This was carried out on the sinus formation as well. The brain began to pulsate regularly, and the cerebral spinal fluid flowed freely. The dura

[1] This work has been carried out under the auspices of the Dept. of Experimental Neurology & Neurosurgery of Stuyvesant Polyclinic.

[2] Director of Experimental Neurology & Neurosurgery at Stuyvesant Polyclinic.

was left open, and the incision was repaired with separate silk sutures in temporal muscle. Fascia was not closed. Skin was closed by separate silk sutures in two layers.

On the left side a similar incision was made and the skull was entered in the same fashion. The dura was thickened but meningeal varicosities were not found. The dura was opened in a stellate manner. The brain was seen to be congested, but no venous angioma was demonstrated. Closure was carried out in a manner similar to that on the right side.

Cardiac monitoring during surgery. Prior to the induction of anesthesia a conventional 12-lead electrocardiogram was made and found to be within normal range. Vectorcardiographic study was made in the frontal, sagittal and horizontal planes with electrode placement based on the cube reference system as modified by Grishman (1) and others and was found to be within the physiological averages outlined by Young and Wolff (5).

Constant monitoring with the "Vector-View" afforded conventional electrocardiographic image at any time desired; however, the majority of the monitoring was of the vectorcardiographic "loops" in the customary planes. This particular equipment allows ECG monitoring as well as vectorcardiographic study in all three planes whenever desired with only one control switch.

Throughout this surgical procedure there was no alteration in the vector patterns. Slight change in cardiac rate was seen upon opening the dura, which was due to the temporary drop in blood pressure that accompanies this maneuver; however, normal rate and rhythm were reestablished in a few moments without treatment. No alteration of the vector pattern was noted at this time, however.

Complete distortion of the vector loops occurred at the time the electrocoagulation took place, obviously due to the skin potential brought about by the high frequency current. It is recommended that equipment such as the "Vector-View" be turned off during such maneuvers.

Summary and Conclusions

1) A cardiac view throughout a surgical procedure is a major step forward in the science of surgery.

2) By the method described herein, we not only have conventional ECG methods at our disposal, we, as well, have a complete vector system, allowing views in the frontal, sagittal and horizontal planes.

3) Another innovation of the "Vector-View" allows the anesthetist with the simple flick of a switch to institute electrical shocking should cardiac arrest occur. The rate of shock can be controlled by the manipulator so that any rate that may be demanded by the situation at hand may be available.

4) The importance of this forward step in the control of the surgical patient from a cardiac standpoint is obvious to any surgeon and anesthetist. Another advantage is the evaluation of cardiac strain in a wide variety of surgical procedures. It has value as a means of cardiophysiological investigation during surgical procedures and manipulations.

5) It is most interesting to note that all of the electrical equipment that was of necessity used in the operating theater, during the procedure described, did not affect the function of this unit whatsoever, except when the electrocoagulator was actually applied to the patient.

The author wishes to express his appreciation to the Electro Mechanical Development Company for their kindness in allowing the use of the original prototype model of the "Vector-View" in this demonstration.

Bibliography

1. Grishman, A., and Scherlis, L.: *Spatial Vectorcardiography.* Philadelphia: W. B. Saunders Company, 1952.
2. Rosner, S.: Cerebral venous angioma as a cause of cerebral birth palsy. A review of 22 cases proved by craniotomy. Read May 12, 1955, Buffalo Meeting, Med. Soc. of the State of New York.
3. Rosner, S.: Venous angioma as a cause of cerebral birth palsy. A review of 34 cases proved by craniotomy. *J. Nerv. & Ment. Dis., 122:* 276–281, 1955. Abstracted in *Digest Neurol. & Psychiat.*, p. 185, 1956.
4. Thorek, M.: Impending death under anaesthesia. *J. Internat. Coll. Surgeons, 22:* 134, 1954.
5. Young, E., and Wolff, L.: Normal vectorcardiogram, I. *Am. Heart J., 5:* 713, 1956.
6. Zoll, P. M., Linenthal, A. J., and Norman, L. R.: Treatment of Stokes-Adams disease by external electric stimulation of the heart. *Circulation, 9:* 482–493, 1954.

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EFFECT OF AUDITORY STRESS ON RATS IMPLANTED WITH HUMAN TUMORS[1]

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Toolan (19) has demonstrated that human tumor tissue can be grown subcutaneously in x-irradiated and cortisonized rats. Handler (11) has shown that mice bearing ACTH-secreting pituitary tumors can serve as hosts for heterologous tumor tissue. According to Furth (8) these pituitary tumors increase the cortisone output of the adrenals, thus enabling the heterologous transplants to grow without administration of exogenous cortisone. Although cortisone, Kendall's compound E, has not been found in the peripheral blood of rats (5), corticosterone, Kendall's compound B, has been identified (2). Preliminary evidence suggests that when compound B is substituted for cortisone, human sarcoma, H.S. #1, will grow in x-irradiated female rats.[3]

The work of Selye (15, 16) on the resistance of tissue to injury by irritating substances indicates that systemic stress influences pituitary-adrenal function. As a systemic stressor, Selye has employed restraint of free motion by tying animals to a board. Weininger (21), in an experiment to determine the effects of early experience on physiological damage under stress in rats, has also used a restraining technique together with starvation and exposure to bright illumination. Näätänen and Jänkälä (12) of the University of Helsinki, concerned with the effect of psychic stress on the pituitary and suprarenal glands of rats, exposed their animals to brilliant flashes of light, loud modern dance music, allowed a cat to walk around the cage, and threatened the rats with pincers. In the present study another widely known and standardized technique for producing psychological stress (1, 7), an audiogenic seizure apparatus, closely modeled on one described by Riess, Spain and Molomut (13), was used. While we are aware of limitations in the assumptions and in the stress technique of this experiment, this paper reports the results of an initial effort to substitute endogenous corticoids, through the use of stress, for exogenous cortisone in the unique Toolan type of human-tumor-rat-host system.

SUBJECTS AND EQUIPMENT

Sixty weanling female albino rats, Wistar strain from the Charles River Breeding Farms, were used, approximately 4 weeks old and weighing 50 to 53 gm. upon initial selection. These were the customary sex, age, and weight for this type of heterologous transplant work.

The experimental apparatus consisted of a circular galvanized tub 22 in. in diameter at the upper edge, 18½ in. in diameter at the bottom, and 10¾ in. deep, and an electric doorbell 4 in. in diameter, activated by a 6-volt transformer and suspended from a plastic hose support stretched across the top of the tub in such a way that the clapper of the bell was slightly above the geometrical center of the enclosure. The tub was covered by a 2 ft. square sheet of ¼ in. plate glass. Light was evenly distributed over the floor of the tub from a 60-watt ceiling lamp.

PROCEDURE

Two experimental series were run, the second starting a week after the first. Each series involved 30 animals of a given week's shipment from the breeding farm and was divided into 3 groups of 10 animals each. There

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were ultimately 20 animals in each of 3 groups. The groups will be referred to as the x-ray (or X) group, the cortisone (or E) group, and the audiogenic stress (or AGS) group.

Animals in the x-ray group received 150 r. of x-irradiation to the total body in a single dose. Three days post-irradiation, 0.5 ml. of a 70 per cent human sarcoma tissue suspension was implanted subcutaneously in the flank of each rat, and then they were routinely maintained, 10 to the cage, until autopsy on the eleventh post-transplantation day. Since all rats are routinely x-irradiated, this group served as the control for the other two groups. The human sarcoma tissue, H.S. # 1, described by Toolan (19), had been maintained by serial transplantation in the Human Tumor Laboratory for over one year.

Identical x-irradiation, implantation, and autopsy schedules were followed for the cortisone group. In addition, immediately after the tumor implantation, each rat in this group was given a subcutaneous injection of cortisone acetate[4] at a dose of 60 mg./kg. of body weight. Three additional injections of cortisone acetate, each at a dose of 60 mg./kg., were given on alternate days following the implantation date.

The audiogenic stress group also followed the identical x-irradiation, implantation and autopsy schedule. In addition, animals in this group were stressed daily in the forenoon of each of the 14 days of the experimental sequence, from x-irradiation until autopsy. The procedure with this group was as follows: The cage was brought into the stimulus room, one animal was removed to the tub, and the cage was returned to a dark corridor. To insure uniform handling, the animals were transferred from cage to experimental field held by the tail with an 11-in. metal uterine clamp, the tips of which were lined with cotton and rubber tubing. The bell was activated after the plate glass cover was placed on the tub and was rung continuously for exactly two minutes regardless of the type of response obtained. Each animal was removed to the maintenance cage upon cessation of the ringing, the cage being brought back into the experimental room for this purpose. The next animal was placed in the apparatus, and the maintenance cage was returned to the corridor. All animals other than the one in the tub were shielded from the sound of the bell.

[4] Supplied under the name Cortone acetate through the courtesy of Merck & Co., Rahway, New Jersey.

Results

Of the 20 rats subjected to the bell ringing for 14 daily periods of 2 minutes each, a total of 7 animals, or 35 per cent, gave clear outward evidence of running or tonic-clonic seizures. One animal ran convulsively 13 out of its 14 trials. One animal ran convulsively 3 times and went on to a tonic-clonic seizure on another occasion. Two animals ran convulsively twice each; two animals ran convulsively once each; and one animal responded with running followed by a tonic-clonic seizure on one occasion. In various instances an animal proved to be unusually immobile, almost transfixed, and waxy and moldable after the bell stopped ringing; however, unless the animal met the criterion of wild, uncontrollable running or of tonic-clonic reaction, it was not considered to have experienced a seizure. The total body weights and the ratios of weights of thymus, adrenals, and spleen to total body weights were compared for the group of 7 rats which had seizures and the other 13 rats in the AGS group. No significant *t*-ratios were obtained from these comparisons, thus indicating absence of differences within the AGS group.[5]

On autopsy, it was found that the general bodily health of animals in the different groups varied. Two of the cortisonized animals died within a few days of the scheduled time for autopsy, thus reducing the size of the group reported upon to 18 since these two animals were not discovered soon enough after death to be autopsied. Nine of these 18 gave evidence upon gross post-mortem examination of infections or dysfunction of various organs such as lungs, liver, kidney and spleen. Five of the 20 animals which received only irradiation showed lung consolidations or enlarged spleens or pale livers. Of the 20 stressed animals only 1, an animal which had 2 running seizures, showed any signs of disease, in this case a slight spotting of the lungs.

All 18 of the autopsied cortisonized animals showed evidence of active growth and prolif-

[5] A probability level of .05 is adhered to in reporting all statistical findings in this paper unless otherwise noted. In those cases in which variances were not homogeneous, a special *t*-test was used for comparisons of differences between means (17).

TABLE 1.—Comparisons of Body and Organ Weights

Organs	Group Means			Difference between Means by *t*-ratio		
	X-ray only (X) N = 20	Stressed (AGS) N = 20	Cortisone (E) N = 18	X vs. AGS	X vs. E	AGS vs. E
Total body weight at autopsy (grams)	90.7 ± 2.9*	96.2 ± 3.3	63.6 ± 2.2	Non-sig.	$p < .001$	$p < .001$
Adrenals weight per 100 grams of body weight (milligrams)	31.6 ± 2.1	29.1 ± 1.6	24.8 ± 2.7	Non-sig.	Non-sig.	Non-sig.
Thymus weight per 100 grams of body weight (grams)	.27 ± .02	.22 ± .03	.06 ± .01	Non-sig.	$p < .01$	$p < .01$
Spleen weight per 100 grams of body weight (grams)	1.08 ± .06	.92 ± .06	.73 ± .05	Non-sig.	$p < .001$	$p < .05$

* Standard error of the mean.

eration of the implanted tumor tissue. The tumors ranged in weight from .52 to 10.45 gm., averaging 4.13 gm.

The 20 rats which had been merely irradiated and the 20 stressed rats did not show any tumor growth. Six of the stressed animals, 3 of the 7 having seizures and 3 of the 13 having none, and 5 of the x-ray group presented no recoverable residue from the implantation. The balance of both these groups bore cysts in which the tumor implant had been encapsulated in liquid or solid form. The cysts in the stressed group weighed from .05 to .81 gm., averaging .25 gm. In the x-ray group the cysts weighed from .07 to .56 gm., averaging .18 gm. Histological examination of the implantation site cysts of the AGS group revealed very few viable tumor cells with fairly large amounts of inflammatory tissue present. The x-ray group yielded somewhat similar findings with less reaction tissue present in the cysts.[6]

An opportunity was afforded in the course of this experiment to study the differential effects of auditory stress and of cortisone on body weight and on various body organs. Although the rats had all been chosen from batches of animals weighing 50 to 53 gm., with the exception of one 49 gm. and one 57 gm. animal both of which were in the AGS group, the average weights for the 3 groups varied at the time of autopsy. The final body weights of the x-ray group averaged 91 gm. (range 63 to 113), of the stressed rats 96 gm. (range 60 to 122), and of the cortisonized animals 64 gm. (range 46 to 78). The cortisone group mean was significantly different from the means of each of the other two groups, by *t*-test, at the .001 level. The x-ray and AGS groups did not differ significantly (table 1).

Since there were significant differences in total body weights among the groups, the adrenal weights were compared in terms of ratio of adrenal weight (in milligrams) to total body weight (in grams) times a factor of 100. The average adrenal ratios for the X, AGS, and E groups, respectively, were 31.6, 29.1 and 24.8. The ratios of thymus weights (in grams) to total body weights (in grams) times a factor of 100, averaged .27, .22, and .06, respectively, for the X, AGS, and E groups. Similarly computed spleen ratios averaged 1.08, .92, and .73. Analysis of variance indicated significant differences among the means of the 3 groups, at the .005 level, for total body weight, thymus ratios, and spleen ratios. Adrenal ratios were not significantly different at even the .05 level. Variances were homogeneous for the body weights and adrenal and spleen ratios but not for the thymus ratios. The ratios of the x-ray group and the AGS group did not differ significantly by *t*-test for any of the three organs.[5] With respect to thymus ratios the cortisone group differed from both the x-ray group ($p < .01$) and the AGS group ($p. < .01$). Also, with respect to spleen ratios the cortisone group differed from both the x-ray group ($p. < .001$) and the AGS group ($p < .05$). However, the cortisone group was not significantly different from

[6] Acknowledgment is gratefully made of the services of Dr. Stephen S. Sternberg of the Histopathology Laboratory of the Sloan-Kettering Institute for examination of all histological specimens.

either of the other two groups with respect to adrenal ratios (table 1).

Visual inspection of the uterus of each animal was made to determine whether or not the organ was under the influence of estrogen at the time of autopsy. The uteri of 2 of the 20 x-ray control animals, 9 of the 20 AGS animals, including 3 of the 7 having seizures, and 1 out of the 18 cortisonized animals showed gross evidence of being under the influence of estrogen, that is, they were well vascularized and edematous. By chi square, the AGS group differed significantly from each of the other groups in having more animals with uteri under the influence of estrogen at autopsy.

Discussion

Finger (6), in testing a group of 99 eventually convulsing rats for age at first seizure, found less than half of them susceptible until the age of 61 days or more. D'Amour (3) has reported experimentation (4) on a colony of rats inbred for 25 years at the University of Denver in which susceptibility runs uniformly between 40 and 50 per cent. Bevan (1) reports 50 per cent as about the upper limit for inbred rat colonies. The animals used in this experiment were chosen because of their suitability for tumor transplantation; they were not bred specifically for high susceptibility to audiogenic seizures. Furthermore, they were relatively young, certainly all under 50 days of age, even at the end of the seizure trials. In this study 35 per cent of the human tumor bearing rats subjected to the audiogenic stimulation behaved in a manner which suggested that they had been stressed; that is, they had at least one running or tonic-clonic seizure during the series of 14 trials.

An examination of the tumor transplant data indicates that audiogenic stress, as it was applied in this preliminary investigation, was not effective in promoting the growth of human sarcoma, H.S. #1. Possibly the adrenal glands are not capable of secreting sufficient amounts of corticoid to permit the heterologous tumor implants to grow. Supplementary data reveal also that the stimulated rats did not respond to the bell ringing by any significant change in spleen, thymus or adrenal weights. Under the influence of compound E, an 11-oxygenated steroid, the thymus glands of the cortisonized animals significantly involuted (14). The thymus glands of the stressed animals underwent no such significant change. The spleens of the stressed rats did not show involutional changes either, though the spleens of the cortisonized animals were significantly smaller than the spleens of the controls, a finding congruent with a report of Spain and Molomut dealing with mice (18). The absence of an effect on these organs implies that the audiogenic stress was not sufficient to elicit a measurable physiological response in the human tumor bearing irradiated rat. More intense, longer sustained, or more frequently repeated audiogenic stimulation or else a more diversified stress technique might have had more effect. It would be premature, in any event, in the absence of physiological response to draw firm inferences from these data as to the inability of stress in general, and audiogenic stress in particular, to affect the growth of human tumors in the rat. When other stress techniques have been used and larger numbers of behavioral and measurable physiological responses have been observed in the human tumor bearing rat, then it will be possible to evaluate more definitely the relationship of stress and heterologous tumor growth in the rat.

The adrenal ratios of the stressed animals did not differ significantly from those of the x-ray controls. Histological examination of the adrenals of the cortisone group showed small cells with all zones of the cortex equally reduced in size, while the adrenals of the x-ray and AGS animals appeared normal. When allowance is made, however, for the considerably smaller body bulk of the cortisonized animals through comparison of adrenal ratios, no significant difference is found between the cortisonized group and the control group. The absence of significant hypertrophy in the stressed group is consistent with findings of Yeakel *et al.* (22), but at variance with findings of D'Amour and Shaklee (4), Weininger (21), and Näätänen and Jänkälä (12). These contradictory findings might arise from the fact that adrenal size or weight may not be the best index of adrenocorticotrophic activity (9, 10).

Selye (15, 16), studying inflammation phenomena in female albino rats, found that systemic stress inhibited exudative inflammation in intact animals but not in those which had been adrenalectomized and then maintained on desoxycorticosterone acetate. He

attributed the difference to the presence of the adrenals and to endogenous adrenal hormones. Riess *et al.* (13) found that seizure susceptible mice subjected to audiogenic stimulation showed impaired ability to produce granulation tissue after suffering a simple traumatic wound. They further reported that the effect of sound-induced seizures on basic repair processes may not be mediated entirely by the secretions of the adrenal body since their adrenalectomized seizure susceptible mice, maintained in salt balance by DOCA, showed the same impairment in wound healing as their intact animals.

Almost half of the total group of stressed animals, 3 out of 7 of those having seizures and 6 out of 13 of those not having seizures, had uteri under the influence of estrogen at the time of autopsy. Only 6 to 10 per cent of the other two groups did so. This difference is significant. Velardo *et al.* (20) found that cortisone acetate in doses of 0.5 to 3.75 mg. in intact animals produced uteri usually weighing less than uteri of ovariectomized virgin control animals. When given concurrently with a standard dose of 0.1 μg. estradiol, it was found that cortisone inhibited the uterine growth promoting action of the estrogen. Further research is required to elucidate the differences in condition of the uteri found in the present tumor implant study.

Summary

Sixty weanling female rats were given whole body x-irradiation and implanted with human tumor tissue, H.S. #1. Twenty of these animals were given injections of cortisone which is known to promote growth of the implants. Twenty were subjected to 2 minutes of auditory stimulation, bell ringing in a metal tub, daily for 2 weeks to promote secretion of endogenous corticoids. Twenty were maintained as controls. At autopsy, all 18 of the cortisonized animals which survived the experimental procedure gave evidence of active growth of the tumor implant, but none of the stressed or control animals did so. Differences found in general health, total body weight, and in condition of thymus glands, spleens, adrenals, and uteri of the animals of the 3 groups are discussed.

BIBLIOGRAPHY

1. Bevan, W.: Sound-precipitated convulsions: 1947 to 1954. *Psychol. Bull., 52:* 473–504, 1955.
2. Bush, I. E.: Paper-chromatographic study of the secretion of the adrenal cortex in various mammalian species. *J. Physiol., 115:* 12P–13P, 1951.
3. D'Amour, F. E.: Personal communication, January 26, 1956.
4. D'Amour, F. E., and Shaklee, A. B.: Effect of audiogenic seizures on adrenal weight. *Am. J. Physiol., 183:* 269–271, 1955.
5. Done, A. K., Ely, R. S., Raile, R. B., and Kelley, V. C.: Species differences in circulating 17-hydroxycorticosteroid concentrations. *Proc. Soc. Exper. Biol. & Med., 81:* 667–669, 1952.
6. Finger, F. W.: Factors influencing audiogenic seizures in the rat. II. Heredity and age. *J. Comp. Psychol., 35:* 227–232, 1943.
7. Finger, F. W.: Convulsive behavior in the rat. *Psychol. Bull., 44:* 201–248, 1947.
8. Furth, J.: Experimental pituitary tumors. In *Recent Progress in Hormone Research,* Vol. XI. G. Pincus, Ed. New York: Academic Press, 1955, p. 221–249.
9. Greenspan, F. S., Li, C. H., Simpson, M. E., and Evans, H. M.: Adrenocorticotropin. In *Hormone Assay.* C. W. Emmens, Ed. New York: Academic Press, 1950, p. 205–213.
10. Greep, R. O., and Deane, Helen W.: The cytology and cytochemistry of the adrenal cortex. *Ann. New York Acad. Sc., 50:* 596–615, 1949.
11. Handler, A. H.: Growth of human tumors in mice bearing ACTH-secreting pituitary tumors. *Proc. Am. A. Cancer Res., 2:* 22, 1955, Abstract.
12. Näätänen, E. K., and Jänkälä, E. O.: Effect of psychic stress on the cells of the pituitary body and the suprarenal glands of rats. *Ann. med. exper. et biol. Fenniae, 32:* 410–418, 1954.
13. Riess, B. F., Spain, D. M., and Molomut, N.: The effect of subconvulsive audiogenic stress on recovery from physiological damage. *Psychol. Rep., 1:* 267–275, 1955.
14. Selye, H.: *Textbook of Endocrinology,* 2nd Ed. Montreal: Acta Endocrinologia, 1949.
15. Selye, H.: On the mechanism through which hydrocortisone affects the resistance of tissues to injury. *J.A.M.A., 152:* 1207–1213, 1953.
16. Selye, H.: An experimental model illustrating the pathogenesis of the diseases of adaptation. *J. Clin. Endocrinol., 14:* 997–1005, 1954.
17. Snedecor, G. W.: *Statistical Methods,* 4th Ed. Ames, Iowa, Iowa State College Press, 1946.
18. Spain, D. M., and Molomut, N.: Effect of cortisone on wound healing in mice. *Science, 112:* 335–337, 1950.
19. Toolan, Helene W.: Transplantable human neoplasms maintained in cortisone-treated laboratory animals: H.S. #1; H.Ep. #1; H.Ep. #2; H.Ep. #3; and H.Emb.Rh. #1. *Cancer Res., 14:* 660–666, 1954.
20. Velardo, J. T., Hisaw, F. L., and Bever, A. T.: Inhibitory action of desoxycorticosterone acetate, cortisone acetate, and testosterone on uterine growth induced by estradiol-17β. *Endocrinology, 59:* 165–169, 1956.
21. Weininger, O.: Physiological damage under emotional stress as a function of early experience. *Science, 119:* 285–286, 1954.
22. Yeakel, Eleanor, H., Shenkin, H. A., Rothballer, A. B., and McCann S. M.: Blood pressure of rats subjected to auditory stimulation. *Am. J. Physiol., 155:* 118–127, 1948.

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BODY IMAGE AND PARALYTIC POLIOMYELITIS

An Experimental Approach[1]

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Psychological changes associated with paralytic poliomyelitis have been investigated recently (2, 4, 5). There is fairly general agreement with respect to certain aspects, such as retention of intellectual capacity and an increase in dependency (8); but speculation is marked as to alteration in self concept.

Body images of victims of paralytic polio continue to be focal in the investigations of such patients. That interest should be centered here is easily understood. It is an important area for the comprehension of self feelings of individuals afflicted with this disease. However, it is also apparent that studying such patients affords a unique opportunity to investigate the effects upon the image of the self of a relatively sudden and drastic alteration in physical status.

Schilder states that "The image of the human body means the picture of our own body which we form in our mind, that is to say the way in which the body appears to ourselves." Schilder (6) and Bychowski (1) have also stressed body image modifiability with loss as well as with gain of bodily function and skills. Processes of growth and decline may be reflected in the relatively great discrepancy in body image among pubertal youngsters and in involutional states. Experimental evidence for differences in body image in growth and senescence has been presented in a separate paper by one of the authors (3). Consistent with Schilder's comment that "When we build up a persistent and coherent image of the body we built it up out of our emotional mood which is based upon biological tendencies", we might anticipate changes in body image as one result of paralytic polio.

Observations of Prugh and Taguiri (4) suggest that certain changes presumed to be associated with alterations in body image do occur in polio. They claim evidence of heightened castration anxiety among adolescent victims of the disease and that extreme denial and primitive fantasy are the salient defenses of these patients.

A psychoanalytic framework has been utilized by them to structure their observations.

Glud and Blaine (2) have attacked the problem with a similar orientation. Their study utilizes such concepts as annihilation threat, mutilation fears, altered perception of the environment, compensatory extensibility of the body image, and incorporation of the equipment as part of body image.

It is somewhat unfortunate that the studies cited above have not been more circumscribed in the area of concentration. We feel that too broad a spectrum of behavior is included under the rubric "body image" in these studies, thus making it difficult to separate body image from other factors of personality. The lack of any control group is another inadequacy of these attempts to study the problem.

The present paper is a report of an attempt to apply experimental methodology to an investigation of body image. Our immediate purpose is to ascertain whether polio patients view their bodies in a manner that is different from that of normal, non-impaired persons.

METHOD

The subjects for this study were drawn from the Respiratory Center of the University of Illinois Research and Education Hospitals.[4] The patients are considered to be representative of the typical population of a Center of this nature. Table 1 describes the characteristics of this group.

The control subjects were female student

[1] The study was carried out at the University of Illinois, College of Medicine, under the auspices of the National Foundation for Infantile Paralysis.

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[4] The Center is sponsored by the National Foundation for Infantile Paralysis.

nurses in a neuropsychiatric hospital. All were volunteers who were unaware of the purpose of the investigation. They ranged in age from 21 to 27, with a mean age of 22. All are regarded as healthy and normal individuals.

For a psychological evaluation of subjects as incapacitated as those in our patient sample it was necessary to devise special instrumentation. To afford maximal opportunity for the expression of body-related feelings the writers devised a scale involving estimation of body parts, a word choice test involving symbolized activity levels, and a word choice test designed to obtain a symbolic self description. These tasks are an indirect assessment of attitudes toward body image and allow for the projection of body image related feelings. The techniques are described in detail below.

Part I. Estimation of body parts

The subject's estimation of certain of their limb and anatomical measurements was used to discover if there were trends toward either distortion or over compensation and to assess any associated anxiety. The parts of the body selected were those least likely to have been actually measured. The instructions were as follows: "This is a series of questions having to do with certain dimensions of your body. I want to see how accurately you can answer them. Try to do your best on each. If you are not certain, guess, but give your answer as quickly as you can".

1. How many inches is it around your ankle?
2. Imagine a straight line extending from the bottom of your ear lobe to the tip of your chin, going through your cheek. How long would it be?
3. How many inches is it around your leg, at the kneecap?
4. How many inches is it from your elbow to your armpit?
5. How many inches is it from your navel (belly button) to your chin?
6. If you drew a circle around the side of your head so that the bottom touched your adams apple and the top touched the top of your head, how many inches would it be around the whole circle?
7. How many inches is it from your wrist to your elbow?
8. How many inches is it from your ankle to your kneecap?
9. How long is your spinal cord?
10. When you are sitting down, how many inches is it from the chair seat to the top of your shoulders?

The significant variables were the estimates themselves and the interval between the time of stimulus presentation (the item) and the response. The latter served as an index of anxiety with respect to the stimulus.

Part II. Symbolized activity modes

Scrambled sentences were utilized as the stimulus material for this task. Here we are dealing with the functional image of the body, i.e., how the body image is represented with respect to a conceptualized level of activity. The instructions were as follows: "I am going to show you a number of sentences which are in a mixed up order. If you leave out one word and rearrange them each sentence will make good sense. Do this as quickly as you can." The stimulus sentences are listed below.

1. He run to sit likes.
2. He works day rests all.
3. He sports watch play likes to.
4. He ball the hit missed.
5. He weak thought strong he was.
6. She quiet men active likes.

TABLE 1.—CHARACTERISTICS OF THE PATIENT POPULATION*

Age	Sex	Duration of Illness (from onset to date of evaluation)
		mos.
29	Male	6
33	Female	13
36	Female	17
21	Male	4
28	Female	5
16	Male	3
24	Male	13
25	Male	3
29	Male	4
26	Male	43
37	Male	33
20	Female	3
38	Female	4
20	Male	27
33	Female	5

* All were characterized as severely impaired in terms of functioning.

The stimulus words reflect polar concepts to see whether polio patients would respond with a reduced emphasis on bodily activity or would compensate by stressing the activity words. Recorded intervals between stimulus presentation and response served as an index of anxiety with respect to the stimulus concept.

Part III. Symbolic self description

In this phase the subjects were shown six cards with words on them. The first two cards were headed by neutral nouns and included four numbered adjectives. The remaining four cards were headed by body image words and contained four numbered adjectives. Subjects were instructed to make up one sentence for each card using only one of the numbered words along with any other words they wished. One of the neutral and one of the critical items are presented below by way of illustration.

Item 1 (Neutral) desk		Item 4 (Critical) grip	
1. equipped	3. shiny	1. strong	3. firm
2. dusty	4. broken	2. weak	4. loose

The two neutral items were presented first and were followed by the four critical body image items. The variables were choice of word, response interval, and changes in response interval from item 2, the last neutral item, to item 3, the first critical item.

Results

Part I. Two measures were used to evaluate body image schema: the estimates of the body parts and the time required to make these estimates. The first was found to be similar for experimental and control groups. Such differences as appeared on several of the items did not approach statistical significance.

In order to determine whether mean response times differed, the individual mean times of all the subjects were combined into one distribution. A fourfold contingency table was set up and a chi square computed, using Yates Correction. The resulting chi square (4.80) is significant ($p < .05$).[5]

[5] The mean over-all time difference between the groups is 2.1 records. We are grateful to Dr. Saxton of the Respiratory Center for his observation that the respiratory aids utilized by the patients are regulated on the basis of a 4-second cycle, 2 seconds for inspiration and 2 seconds for expiration. The gross time difference between the groups can be accounted for on this basis.

TABLE 2.—A Comparison of Time Performance on Individual Items of Task I (Body Part Estimation) by Experimental and Control Subjects

Item	Number Below the Median		χ^2
	Polio	Controls	
1	9	9	0
2	8	8	0
3	6	9	.5
4	6	9	.5
5	5	11	3.25*
6	5	10	2.13
7	4	11	4.80†
8	7	9	.13
9	4	12	6.56‡
10	6	10	1.2

* $p < .10$.
† $p < .05$.
‡ $p < .02$.

In order to rule out the possibility that respiratory difficulties of the polio patients were the only reason for differences, further analysis was undertaken. The reaction times of both groups with respect to single items were now combined in separate distributions. The chi square median test (7) was applied to these distributions, using Yates correction for one degree of freedom. Table 2 shows the chi squares for the individual items. It is apparent from the data that the over-all significance of difference between the groups is primarily the result of three individual items, numbers 9 ($p < .02$), 7 ($p < .05$), and 5 ($p < .10$). These items can be found in the description of methodology.

Part II. With respect to active and passive words no significant group differences were found. The choices of both groups were similar. Utilizing the chi square median test, response times were evaluated. Table 3 shows the resulting chi square values and their levels of significance as well as the combined level of significance for the six items. The over-all chi square is significant ($p < .01$). Three items appear to determine the significance of the difference: 4 ($p < .01$), 5 ($p < .05$), and 6 ($p < .10$). These items involve choices between the words strong-weak, hit-miss, and active-quiet.

Part III. This section permits three measures: use of the critical body image word, the adjective chosen, and the time of response. Using a chi square median test it was deter-

TABLE 3.—A COMPARISON OF TIME PERFORMANCE ON INDIVIDUAL ITEMS OF TASK II (SCRAMBLED SENTENCES) BY EXPERIMENTAL AND CONTROL SUBJECTS

Item	Number Below the Median		X^2
	Polio	Controls	
1	4	9	2.17
2	6	10	1.205
3	6	10	1.205
4	4	13	8.68*
5	6	13	5.17†
6	6	12	3.79‡
			22.22*

* $p < .01$.
† $p < .05$.
‡ $p < .06$.

TABLE 4.—A COMPARISON OF THE NUMBER OF POLIO PATIENTS AND CONTROLS, USING LEAD WORDS IN TASK III

Item	Number		X^2
	Polio	Controls	
1	3	9	3.79*
2	7	13	3.75*
3	3	13	10.84‡
4	6	13	5.17†
5	7	13	3.75*
6	7	13	3.75*
			31.05‡

* $p < .07$.
† $p < .05$.
‡ $p < .001$.

mined that the two groups differ significantly in the use of the unnumbered lead word. Table 4 shows the number of subjects who used the lead word on each of the six trials. It is seen that the polio patients significantly less frequently used the lead word ($p < .001$) with the exception of item 2, one of the neutral items; no differences in adjective choice were revealed. Since item 2 is one of the neutral items, no explanation for this difference is immediately apparent. As this is the only significant item, it may be considered a chance difference.

The reaction times for the experimental and control groups were compared by means of a chi square median test, computed on the basis of the individual items and over the six items. Only item 3 is significant ($p < .05$). This is the first critical body image item, i.e., the point of transition from the relatively innocuous neutral items. It is only at this point in this task that the polio patient takes significantly longer to form and articulate his sentences.

DISCUSSION

The results presented above have indicated that differences between the groups are solely those of reaction time. Although mean reaction times of the groups differed due to limitations involved in the disease, it has been shown that single items reflecting emotional factors have largely determined the significance of difference between them.

On all three tasks most items, taken separately, show no significant time differences in favor of the normal control subjects. In fact, some items favor the patients. Another point may be considered in this connection. If the respiratory problems and the fatigability seriously impaired the ability of the experimental subjects to respond, one might expect an increase in the number of significant differences as the experiment progressed. This is not the case. In actuality, part III reveals only one significant difference. This is on item 3, the transition point from the neutral items to the critical items. We may thus infer that the differences revealed are indeed the product of some emotional factor operant in the polio patient. We believe this factor to be body-image-related-anxiety.

The fact that no significant differences were obtained with respect to body part estimates and symbolic body attributes suggests that even in the face of such major incapacitation as is involved in paralytic polio, people do not suddenly and drastically alter general body image schemas. The subjects under study did not exaggerate defects, nor did they reveal any extensive over compensation. Self estimation in terms of pre-illness dimensions and attributes underscores the resistance of the polio patient to immediate acknowledgment of bodily changes. The security operations associated with body image are apparently more prepotent that the psychic effects of realistic mutilation, at least in the initial phase of this chronic condition.

The clinical observations of Robinson and Finnesinger would appear to be supported by these findings. "The polio patient abandons the hope of complete recovery most reluctantly and, with strong support from a variety of sources, can almost indefinitely preserve the hope of seeing himself as he was before the illness. . . . All this does not suggest a facilitation of body image changes. It suggests rather that the paralytic poliomyelitis patient should strongly resist the incorporation of a change in self perception and that a significant time lag might be found between the occurrence of somatic change and the patients psychological incorporation of it" (5).

In our analysis of the significant individual items we find that these items cover areas of special importance to the polio patient. In part I the two significant items and the one near-significant item deal with length of spinal cord, hand dimensions and trunk dimensions, respectively. The polio patient is forced to view the world from a supine position, and this might explain anxiety associated with the spinal cord. From interview data it appears that loss of the use of hands was regarded as a most critical impairment by the patients. The body sector from chin to navel is the locus of the chest shell. This life-preserving mechanism is much disliked by the patients. Some are repelled because of its appearance. A more significant reason, however, may be that this underscores the patient's complete dependence upon mechanical aids for survival.

Part II involved a choice between activity and passivity. The desire to regain physical competency is strong. The need to sustain belief that it is possible to do so is frequently in direct conflict with reality. It is this conflict which results in the anxiety experienced in relation to activity passivity choices and which is reflected in the lengthier response times to these items.

In Part III we see revealed an interesting aspect of the polio patient's behavior. This behavior reflects the security operations by means of which he strives to ward off threats, i.e., an excessive compliance with the presumed demands of authority. This phase included the instruction to "use one of the four numbered words." In their desire to obey, the polio patients failed to use the lead words. This failure is even more in evidence in the cases of critical body image words. It may be that the tendency to comply is enhanced by the added factor of anxiety evoked by the body word.

The fact that item 6, in Part I, involving the locus of the tracheotomy in our patient sample, did not significantly differentiate the groups is a finding for which we have no present explanation. Further studies will need to investigate this area as well as the psychological response to other specific alterations in muscle size and function as a consequence of the disease.

The present investigation has suggested a methodology for assessment of body images among paralytic polio patients. Refinements and further research should prove fruitful with respect to the questions as to whether, when, and how polio patients finally resolve the issue of body schemata.

Summary

Fifteen paralytic polio patients and fifteen controls served as subjects of a study designed to investigate body image in paralytic polio. Three experimental tasks were constructed with the aim of obtaining self assessment in physical and in symbolic terms. They were designed with the aim of maximizing the projection of body image within a framework suggested by Schilder's definition of the concept.

No differences were found in body image *per se*. Certain body parts tended to arouse greater concern among the polio patients. These were the chest and abdomen, spinal cord, and the hands. General body-image-related-anxiety was found to be characteristic of the polio group. This anxiety was inferred to be a result of conflict engendered by the attempt to retain the pre-onset body image as reference point in the face of the realistic impairment experienced by the patients.

Bibliography

1. Bychowski, G.: Disorders in the body image in the clinical picture of psychoses. *J. Nerv. & Ment. Dis., 97:* 310–335, 1943.
2. Glud, E., and Blaine, H. T.: Body image changes in patients with respiratory poliomyelitis. *Nerv. Child., 11:* 25–39, 1956.

3. Lakin, M.: Certain formal characteristics of human figure drawings by institutionalized aged and normal children. *J. Consult. Psychol., 20:* 471–474, 1956.
4. Prugh, D. G., and Taguiri, C. K.: Emotional aspect of the respirator care of patients with poliomyelitis. *Psychosom. Med., 16:* 104–128, 1954.
5. Robinson, H. A., and Finnesinger, J. E.: A framework for the psychopathology of poliomyelitis. *Nerv. Child, 11:* 10–17, 1956.
6. Schilder, P.: *The Image and Appearance of the Human body.* London: Kegan, Paul, French, Trubner and Co., Ltd., 1935.
7. Siegel, S.: *Non-parametric Statistics.* New York McGraw-Hill, Inc., 1956.
8. Seidenfeld, M. A.: Psychological aspects of poliomyelitis. In *Poliomyelitis, Papers and Discussions.* Presented at the Second International Poliomyelitis Congress, 1952, J. B. Lippincott Co., Philadelphia, pp. 283–292.

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PERCEPTUAL RHYTHMIC DYSFUNCTION IN UNILATERAL DISEQUILIBRIUM[1]

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In the course of systematic investigations of unilateral disturbances of equilibrium and their influence on various sensory functions, an unusual sensory disturbance was encountered. The observation seemed to be significant as this particular type of rhythmic perceptual dysfunction has, as far as is known to us, not yet been described.

CLINICAL BACKGROUND

G. A., female, aged 50, had generally been healthy. Her present illness began approximately a year ago, and manifested itself by attacks of dizziness which appeared from time to time. She felt uneasy, particularly when walking in the dark. The patient reported that during this period it had often occurred that "in a flash", without any cause and without any warning, she had fallen to her knees without realizing how she had got there. During the last nine months, she suffered from pains in the left eye.

Because of these persistent pains in the left eye, she visited the ophthalmological out-patient department of the Hadassah Hospital. The examination (Dr. B. Methar) revealed normal intraocular pressure and a slight divergent strabismus which had been present from childhood. Visual acuity was 5/24 in the left eye, and 5/10 in the right eye. The pupillary reactions, eye fundi, and visual fields were normal. Since the ophthalmological examination did not reveal any particular reason for the pains in the left eye, she was referred to the department of neurology.

The neurological examination did not reveal any abnormalities of the pyramidal motility, the reflexes, or the various qualities of sensibility. The strength and tone of both right and left extremities were normal. A left-sided disturbance of equilibrium was, however, uncovered. When the patient was asked to close her eyes and to hold her extended arms steadily in front of her body, the left arm gradually descended without her being aware of it. Still keeping her eyes closed, and asked to elevate both arms to the same level, the patient always placed the left arm lower than the right one. When lifting both legs, the left one was also placed lower than the right one without the patient's being aware of it. The patient's body inclined to the left when she was standing with both eyes closed. While walking with her eyes closed the patient tended to deviate to the left. The otological examination (Dr. M. Feinmesser) revealed a binaural diminution of hearing of tones higher than 4000 cps. In addition it should be noted that the high tone hearing impairment of the left ear was 20 decibels worse than in the right ear. The caloric examination revealed bilateral normal reactions. Normal findings were obtained in the x-ray of the skull and special x-ray of the ears including the Petrous bones. The routine electroencephalogram, including photic stimulation, was within normal limits.

PERCEPTUAL RHYTHMIC DYSFUNCTION

The combination of the left eye impairment with a left-sided disequilibrium suggested the possible presence of the sensorimotor induction syndrome. For this reason the patient was examined for the characteristic homolateral symptoms of optic displacement of the spatial coordinates, fusion of closely spaced optic stimuli, change of visual size perception, and dissolution of color perception. These typical disturbances, which were expected to appear when the patient was using the homolateral eye, could not, however, be found. On the other hand, during these special examinations, an unusual disturbance was detected in the left eye. While looking at a specific spot, or fixing her view on a certain object, the patient reported that she experienced an alternating blurring and clearing of vision. The darkening seemed to be located in the middle of the fixated object. The

[1] From the Department of Nervous Diseases of the Rothschild Hadassah University Hospital and the Hebrew University Hadassah Medical School.

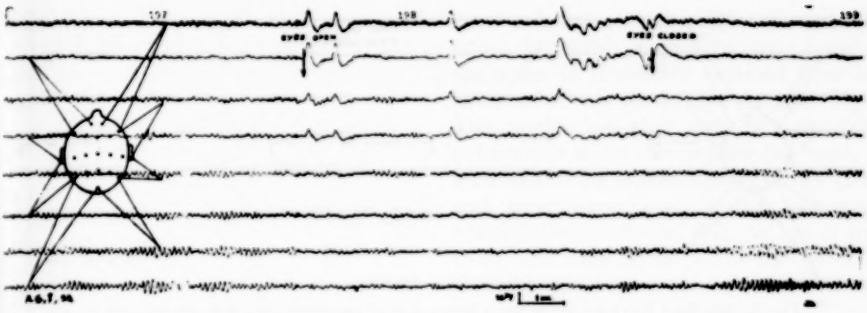

FIG. 1. Resting EEG. Routine recording

alternation of blurring and brightening became increasingly short, and the brightening became less intense than it had been at the beginning, until finally a generalized blurring of vision took place. The subjective sensation of darkness was followed by an automatic closure of the left eye which apparently preceded the next phase of brightening. Upon being questioned, the patient stated that the closure of the eye occurred involuntarily in order it seemed, to avoid the blurring. The sequence of alternating brightening and blurring again appeared when the eye was held open by the examiner. Under this condition the interval between blurring and brightening was shorter from the very beginning, and the complete blurring occurred earlier. The alternating blurring and brightening, which were confirmed on repeated examinations during the whole period of observation, were, interestingly enough, accompanied by changes in the size of the pupil. Observation of the pupils by a synoptophore (Dr. I. Navratzki) indicated a phasic sequence of constriction and dilation of the left pupil. A spontaneous dilation of the left pupil was noted when the patient reported a blurring of vision, while the subjective experience of brightening was accompanied by a spontaneous constriction of the pupil. This phenomenon was not observed in the right pupil. The electroretinograms of both eyes were normal.

The routine EEG performed by bi-polar recording on a Grass eight channel III D model machine was, as mentioned, within normal limits. There was only a mild asymmetry of the alpha activity with a slightly lower amplitude in the left occipital region. On eye opening there was a fairly good blocking of alpha activity (fig. 1). In the course of further EEG examinations a modified EEG recording was employed where the eye opening period was extended from 10 seconds to 3 minutes. This was done at first with both eyes open, then with each eye open separately for a period of at least 2 minutes. Under these conditions different results were obtained. With only the right eye open, the general background activity of the record was similar to that obtained in the routine record with

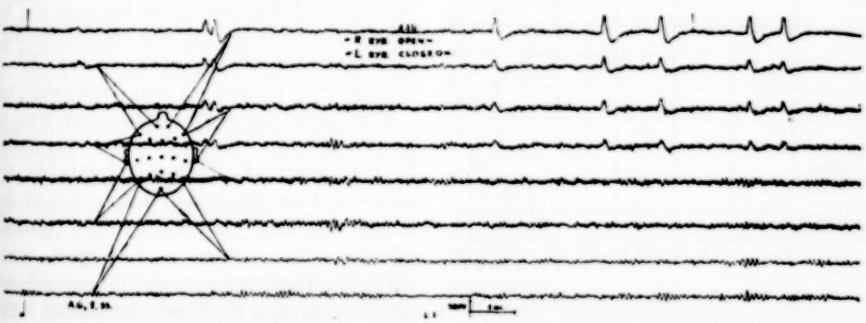

FIG. 2. Modified EEG recording, after 50 seconds of recording with only the right eye open

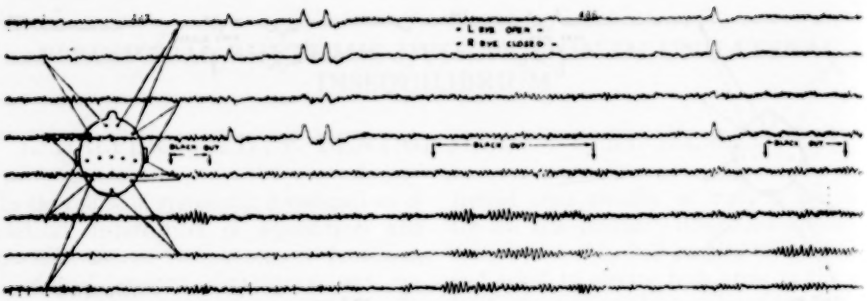

FIG. 3. Modified EEG recording, after 50 seconds of recording with only the left eye open

both eyes open, namely, a fairly good blocking of the alpha activity (fig. 2). With only the left eye open, however, a different pattern was revealed. While the background activity was of low voltage and fast, corresponding to the activity seen during the eye opening period of the routine record, bursts of well-developed alpha activity in the temporo-occipital region did appear. These bursts extended over a period of 1 to 4 seconds, interspaced by periods of low amplitude and fast activity (fig. 3). During the course of the recording it became evident that these "bursts" coincided with the subjective blurring experienced by the patient. The patient reported the blurring 1 to 2 seconds prior to the appearance of the alpha bursts in the record. These bursts terminated somewhat before the patient noted the brightening. The intervals between the alpha bursts were about 4 or 5 seconds in duration.

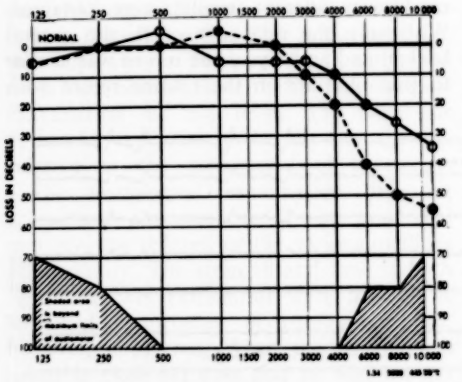

FIG. 4. Audiogram of patient G. A.
Right ear: O———O
Left ear: ●- - - - - -●

The rhythmic dysfunction in the visual sphere raised the possibility of a similar dysfunction in other perceptual spheres. This disturbance was detected at first in the auditory function. The pure tone audiogram of the patient indicated a slight loss in the higher frequencies above 4000 cps. in the right ear, and a more severe loss in the left one (fig. 4). A binaural loudness balance test showed the presence of recruitment. A prolonged 60 db. tone was then presented separately to each ear at a number of different frequencies. At 1000 and 2000 cps. the tone was heard steadily by both ears during the 2-minute presentation. At 6000 cps. the tone was heard continuously during a 4-minute presentation by the right ear. With the left ear, however, the patient reported that occasionally during the 4-minute period she did not hear the tone. At 8000 cps. the tone was again heard steadily by the right ear, while in the left ear it disappeared and reappeared at approximately half-minute intervals. It was interesting to note that during the procedure the patient inclined her body to the left periodically. Upon being questioned, she reported that she did so because the tone went away from her and she tried to follow it. The alternate closing of each eye did not change the picture in any essential way.

Principally the same dysfunction was also determined in the vibratory perception. Several series of vibratory thresholds were obtained from the middle finger tips of both hands utilizing an electrically controlled vibrator; the apparatus employed was a PVD Bio-Thesiometer model. Thresholds were obtained using a modified "method of limits" in which the amplitude of the vibration was

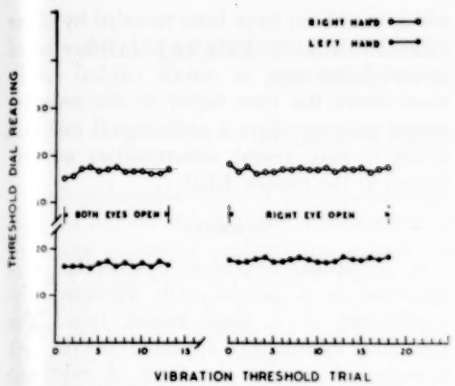

FIG. 5. Vibration thresholds of both hands obtained while both eyes were open, and when the right eye alone was open.

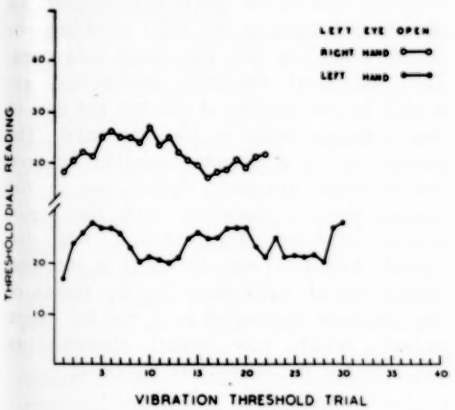

FIG. 6. Vibration thresholds of both hands obtained while the left eye alone was open.

increased from zero to the point at which the subject experienced a just perceptible sensation of vibration. The subject reported the appearance of the sensation of vibration, the amplitude was reduced to zero, and the dial reading was recorded before beginning the next trial. In this manner a number of consecutive readings were taken under several conditions which included each eye being open separately, and both eyes being open together. The threshold values of both hands under all conditions were higher than was to be expected, and indicated some loss in the vibration sensitivity of both hands (fig. 5). While there was very little variability in the data obtained from both hands when both eyes were open, or the right eye alone was open, increased variability was found in the series of thresholds obtained from both hands when only the left eye was open (fig. 6). The results indicated that this variability, particularly in the series of the left hand, was systematic with alternating periods of greater and lesser sensitivity. Various subsequent examinations confirmed that the loss of sensitivity was more severe in the left hand, and that the opening of the left eye tended to increase this loss of sensitivity.

DISCUSSION

As mentioned above, the patient suffered from a left-sided disequilibrium of the displacement type, which presented itself in the descent of the left extremities, in the inclination of the body to the left while standing, and in a deviation to the left while walking. It is of interest that several perceptual rhythmic dysfunctions were found in this patient. The visual rhythmic dysfunction determined in the left eye is most impressive because of the striking correspondence between the subjective sensation and the spontaneous pupillary and electroencephalographic responses which confirmed the organic basis for the subjective sensations. This perceptual dysfunction, furthermore, was not limited solely to the visual sphere, but also appeared in the hearing of the left ear, and the vibratory function of the left hand.

As far as is known to us there has been no previous description of a perceptual rhythmic dysfunction of this type in any of the three, visual, auditory, or vibratory modalities. It seems to be of importance that in this case all three functions were in complex involvement, that all three manifested themselves in essentially the same rhythmic manner, and finally that the sensory organs involved were on that side of the body which corresponds to the side of the disequilibrium.

Because this type of dysfunction seems to be unknown in the neurological and psychological literature, it is difficult as yet to attempt a physiopathological interpretation of the phenomenon without entering into speculation.

Several points, however, indicate that the correspondence of the side of the per-

ceptual dysfunction with the side of the disequilibrium is not accidental, but that the two are dynamically related in some manner. This assumption derives support from observations made on patients with the sensorimotor induction syndrome (1), which show that unilaterally disturbed posture may induce homolateral perceptual changes. Another characteristic point is that this influence is not limited to one function, but is more global, affecting several functions in a similar manner.

An additional interesting observation supporting the assumption of a connection between the left-sided perceptual dysfunction and the left-sided disequilibrium is that the threshold of vibratory perception was affected differently by the alternate opening of each eye. While definite rhythmic variability appeared during the opening of the left eye, it disappeared when the right eye was open and the left eye was closed. This corrective effect of the open contralateral eye has also been revealed in patients with unilateral disequilibrium presenting the sensorimotor induction syndrome. This factor has been found to influence the postural attitude as well as the induced sensory changes. The assumption of a relationship between the described two kinds of disturbances is further supported by the observation that, with the gradual improvement of the statokinetic condition, the pains in the eye as well as the sensation of rhythmic blurring, gradually disappeared.

Aside from the clinical significance of the described rhythmic dysfunction, special attention should be drawn to the modification of the EEG recording which was performed in this case. The EEG recording obtained through this modification revealed in this patient the organic nature of a subjective sensation which would not have been revealed by other means. This modification may therefore be of special importance in certain clinical conditions where the time factor or the separate use of each eye plays a pathological role and where it may reveal abnormalities not reflected in the routine EEG.

Summary

A perceptual rhythmic dysfunction was described in a patient with left-sided disequilibrium of a displacement type. The rhythmic dysfunction appeared in the left homolateral eye in the form of rhythmic alternate blurring and brightening. The subjective sensation of blurring was accompanied by spontaneous dilation of the left pupil, and by the synchronous appearance of bursts of alpha in the EEG recording obtained when the left eye alone was open. The perceptual rhythmic dysfunction extended to the hearing of the left ear and to the vibratory sense in the left hand. The assumption of a dynamic relation between the left-sided rhythmic dysfunction in the various sensory modalities with the homolateral left-sided disequilibrium was discussed. Attention was drawn to a modified application of EEG recording by means of the alternate opening of each eye for longer periods, which may reveal abnormalities not reflected in the routine recording.

BIBLIOGRAPHY

1. Halpern, L.: Additional contributions to the sensorimotor induction syndrome in unilateral disequilibrium with special reference to the effect of colors. *J. Nerv. & Ment. Dis., 123:* 334, 1956; and see complete bibliography therein.

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PROMAZINE TREATMENT OF CHRONIC PSYCHOSES IN 100 HOSPITALIZED PATIENTS

MARIE KERSHAW FRAIN, M.D.

The undeniable value of chemopsychotherapy for control of behavioral abnormalities in mentally disturbed patients has earned the respect of the medical profession. None of the ataractic compounds so far available, however, has proved suitable for management of all types of mental disorders (3, 6, 7). The activity of some agents is unpredictable, and the therapeutic benefits have been marred by untoward effects that vary in seriousness and appear to have no relationship to dosage or duration of medication.

A variety of conflicting reports has appeared in the literature in the last few years on the therapeutic worth of reserpine and chlorpromazine, a chlorinated derivative of phenothiazine, in psychiatry. Meprobamate, a chemical relative of mephenesin, also has been recommended for use in the neuroses, the milder psychoses and various central nervous system disorders attended by emotional or muscular tension or both (1, 4, 5, 6). Promazine (2), a newer compound of the phenothiazine series, which resembles chlorpromazine in molecular structure but lacks the chlorine radical, possesses potent tranquilizing properties and has shown an astonishing freedom from deleterious side actions.

To outline the area of effectiveness of any new drug and to clarify the boundaries of the desirable and undesirable properties requires careful observation, vigilance and effort. The purpose of this study was to delineate the limits of ataractic activity obtainable with promazine in institutionalized, chronically psychotic patients, and to determine any associated side effects.

Method

The investigation, begun on May 1 and concluded November 1, 1956, was carried out on a series of 100 females who had been patients for varying lengths of time at this institution, a mental hospital of 5,000 beds. The patients were not selected or grouped in any way. The sole criterion for need of medication was the presence of abnormal attitudes or conduct, such as hostility, resistiveness and uncooperativeness; untidy habits, neglect of personal appearance; overactiveness, noisiness, overtalkativeness; negativistic, combative, destructive or denudative behavior; idleness and inertia; or severe delusions or hallucinations (table 1). Five of the patients were Negroes. Ten, all white women, had active tuberculosis at the time of admission.

The majority (66 per cent) were 20 to 39 years old when admitted. At the start of this study 75 per cent were 30 to 59 years old (table 2).

Length of hospitalization. Classification of the patients as to duration of hospitalization is given in table 3. The great majority (61 per cent) had been institutionalized for six to forty years (table 3).

It may be of interest that for 15 of the patients there was, on admission, a history of psychosis in 1 member of the family; 8 per cent had had 2, 2 per cent 3, and 2 per cent 4 psychotic or mentally deficient relatives.

Previous shock therapy. Seventy-one of the patients had received electroconvulsive therapy (31 had had 1 to 19 shocks; 31, 21 to 105 shocks; and 9, 130 to 277 shocks). Metrazole had been employed for 1 patient.

Previous reserpine treatment. Sixty-seven patients had been treated with reserpine prior to start of medication in this study, 28 for two to ten months, 17 for one year, and 22 for eighteen months to two years. Behavior had been favorably altered in a total of 66 per cent. Thirty-four per cent showed no definite amelioration of symptoms. Two (3 per cent), neither of whom had been diagnosed as epileptic, but who had suffered seizures previously, had convulsions during reserpine medication.

Dosage. Medication with promazine[1] was begun with small oral doses, as 25 to 50 mg., two or three times a day, and was increased or

[1] Available as Sparine® (Promazine Hydrochloride, gamma-dimethylamino-n-propyl phenothiazine hydrochloride), from the Wyeth Laboratories.

TABLE 1.—Symptoms Present in 100 Psychotic Patients and Symptomatic Response to Promazine Medication

	Patients, % of Series	Symptoms	
		Relieved, abated or corrected	Unaltered or relapsed
		%	%
Combativeness	48	45	3
Uncooperativeness	42	42	0
Noisy behavior	45	41	4
Restlessness, overactivity and agitation	34	34	0
Destructiveness	27	22	5
Denudativeness	11	11	0
Resistiveness and hostility	8	8	0
Negativism	2	2	0
Delusions	18	18	0
Hallucinations	7	7	0
Speech disturbances (overtalkativeness, incoherence, or muteness)	13	11	2
Untidiness	12	9	3
Idleness and inertia	8	8	0

TABLE 2.—Ages of 100 Psychotic Patients Treated with Promazine Response to Medication According to Age Groups

Age	On Admission, % of Patients	At Start of Medication, % of Patients	Improved	Unimproved
yr.			%	%
14–18	5	0		
20–29	33	8	8	0
30–39	33	27	23	4
40–49	15	31	22	9
50–59	7	17	14	3
60–69	5	9	8	1
70–74	2	8 (70–76 yrs.)	8	0
	100	100	83	17

adjusted as necessary. One manic patient received the compound by intramuscular injection. Personal hygiene was watched closely; tidiness was encouraged by frequent toileting. Ninety-one per cent were continued on the medication for six months, 7 per cent for five months, and 2 per cent for four months.

Occupational and recreational therapy. The recreation department strained every facility to provide a salutary program affording special activities which would engage the interest of even the most seriously disturbed patients.

TABLE 3.—Classification of 100 Psychotic Patients According to Length of Hospitalization

Years in State Hospital	Patients No.		Response to Medication: Improved	Response to Medication: Unimproved
			%	%
5 mos.	1		1	0
1– 5 yr.	38		32	6
6–10	24		21	3
11–15	13		10	3
16–20	9		6	3
21–25	6	61	5	1
26–30	2		1	1
31–35	4		4	0
36–40	3		3	0
	100		83	17

Results

In the more seriously deteriorated individuals, with a long history of mental disease, the smaller doses were ineffectual. The individual doses were increased so that these patients ultimately received 200 to 400 mg. or more per dose. In the vigorous young patients in whom the abnormal mental pattern was already long established, bizarre conduct was not easily altered. However, as the total daily dosage was increased to 800 mg. and in some cases 1.2, 1.6, 1.8 and even 2 gm., excitement, aggressiveness and other undesirable behavior were usually quickly brought under control.

For the frailer elderly patients, most of whom had been hospitalized for many years, and some of whom were arteriosclerotic, small doses (25 or 50 mg.) of the medication two to four times daily were sufficient. When the total daily dose was increased to 800 mg. or more, weakness, dizziness and malaise occurred in two of the older women who had been patients at the institution more than ten years. Therefore it was considered wiser to stay well within the borders of safety for such patients by administering small amounts frequently rather than to use larger doses at more widely spaced intervals.

Eighty-three per cent of the promazine-treated patients improved in some degree or were relieved of some of their behavioral difficulties, and therefore became much easier to care for (tables 1–4). Seventeen per cent, however, showed no benefit. Three per cent, who

TABLE 4.—MAXIMUM IMPROVEMENT OBTAINED IN 100 PROMAZINE-TREATED PSYCHOTIC PATIENTS

Time Required to Achieve Maximum Response after Start of Medication	Patients
months	%
1	3*
2	13*
3	45
4	14
5	7
6	1
	83

No improvement at any time during medication in 17.

* Maximum response might have been obtained in a larger percentage in the first two months had the early dosages been larger.

became neat and tidy for a time, relapsed into their former neglect of personal hygiene.

Combativeness, present in 48 per cent, was controlled in 45 per cent; resistiveness, in 8 per cent, was abated; and negativism, in 2 per cent, was corrected.

Forty-two per cent of the patients, who were formerly uncooperative, became amenable to institutional routine.

Restlessness, agitation and overactivity, present in 34 per cent, were quieted. Forty-one of the 45 per cent who were noisy became less troublesome. Even the more difficult patients in the semiviolent wards were more subdued and tractable on promazine treatment. Eight per cent, who previously required isolation, were no longer secluded.

Destructiveness disappeared and behavior improved in 22 of the 27 per cent who were already in an advanced stage of deterioration.

Eleven per cent, who formerly had been denudative, resumed decent habits.

Delusions, in 18 per cent, became less prominent and were more easily borne. Hallucinatory experiences in one or more of the spheres, present in 7 per cent, were definitely reduced.

Speech disturbances, including overtalkativeness, incoherence and muteness, prominent in 13 per cent, were corrected in 11, and more normal speech prevailed.

Untidiness, present in 12 per cent, was modified. Nine per cent began to take an active interest in their personal appearance. Five per cent became completely tidy.

In the 8 per cent who were idle and sluggish, constructive work habits replaced the former indifference and lack of energy. Mildly psychotic patients were enabled, on small dosage, to participate in the occupational and recreational program of the hospital.

Fewer attendants were needed for the wards in which promazine was used since, in hitherto unmanageable patients violence was subdued and milder traits appeared. Many of them began to attend to their own wants and did not need to be urged into activity, as before.

The tuberculous patients responded well, in general, to the program of bed rest during promazine medication. Those who formerly had refused to submit to enforced quiescence adjusted far better to such restrictions under the use of promazine.

Sixty-three per cent of the entire series gained weight, 29 per cent lost weight, and in 8 per cent, the weight was unchanged.

Nine were furloughed and 2 were released temporarily for trial visits (a total of 11 per cent); of these, 3 were returned to the institution. Five patients were transferred off the project for various reasons not associated with the medication, and 2 were removed to less restricted wards as they became more tractable.

No electroshock therapy was administered to any of these patients during promazine medication.

Forty-four of the 67 (about 66 per cent) who had received reserpine previously showed greater improvement on promazine; in 20 (about 30 per cent) the benefit achieved with reserpine was maintained with promazine. Thus 96 per cent who had been treated with reserpine responded as well or better to promazine medication. Two who had not responded to reserpine showed no improvement on promazine, and 1 became worse.

Two of the patients who had done well on reserpine, and in fact had made remarkably good progress, were unable to tolerate promazine. One, an 18-year-old schizophrenic girl, reverted to the manic status with all the violence that had formerly characterized her behavior, and she experienced several epileptiform attacks. Total daily doses of 1.8 gm. by intramuscular injection were tried in the hope of controlling this patient, but without success.

TABLE 5.—EPILEPTIFORM ATTACKS DURING MEDICATION

No. Patients	Diagnosis	Seizures during Medication	Previous ECT
Known epileptics (seizures before start of medication)			
1	Epileptic deterioration	3	55
1	Epileptic imbecility	Frequent attacks before and during medication	0
Patients not diagnosed as epileptic			
1	Brain trauma	1	0
1	Schizophrenia	1	17
1	Schizophrenia	1	35
1	Schizophrenia	1	68
1	Schizophrenia	1	142
1	Schizophrenia	4	55 (sporadic seizures before and during medication)
1	Schizophrenia	6	100
1	Schizophrenia	9	31
1	Schizophrenia	9	189
1	Schizophrenia	10	201
1	Schizophrenia	25	38
1	Simple imbecility	8	29
14			

When reserpine was resumed, her response was immediate; she regained her poise and good behavior. Promazine was then tried a second time, with repetition of the unfavorable results.

The other patient, a 40-year-old paranoid schizophrenic, became weak, unable to walk and finally bedfast during promazine medication; deglutition was difficult and eventually impossible. The bizarre symptoms subsided when the compound was withdrawn, but recurred each time medication was resumed.

Seizures. Epileptiform attacks developed in 14 (10 schizophrenics, 1 patient with chronic brain syndrome from cerebral trauma, 2 imbeciles, and 1 with epileptic deterioration) who received large doses (table 5). Two of these patients were known epileptics with history of seizures before ataractic medication was begun. All but 1 had been subjected to electroconvulsive therapy.

The seizure threshold seemed to be lowered as the dosage was increased. No epileptic attacks occurred in any patient receiving less than 800 mg. per day; on the other hand, many patients treated with 1 gm. or more per day had no seizures, and were benefited by the accelerated dosage. An example is the case of a 38-year-old paranoid schizophrenic who had been hospitalized six years, and had shown moderate improvement under reserpine treatment. She became even more cooperative on medication with 2 gm. promazine daily, required no further wet packs, and was able to dress herself and take her meals in the dining room.

An inclination toward increased frequency of seizures has been observed after administration of a variety of agents, including other ataractic compounds, particularly in patients with convulsive tendencies. It may be that such patients, especially those who have sustained more or less brain irritation as a result of electroshock therapy, may react more readily to a chemical stimulus.

SIDE EFFECTS

An extremely careful watch was instituted for the appearance of undesirable effects. Most agreeably, side reactions were remarkably few.

An initial fall in blood pressure, so apt to be dangerous, had been a common occurrence with use of chlorpromazine, and was sometimes seen after administration of reserpine. For this reason, blood pressures were recorded after

the initial dose and thereafter were read weekly or more often for each patient throughout the entire six-month period. The systolic pressure fell to less than 90 mm. Hg in 13 patients after the initial dose. In accordance with instructions, the subsequent dose of promazine was omitted. In almost all of the 13 cases the blood pressure was depressed only after the first dose. On the second or third day of medication the blood pressure seemed to become stabilized in all patients, and afterward was not affected throughout the six-month study period.

A mild blush or rash appeared over the face, neck, arms and upper trunk in 2 patients. This cleared in 48 hours, and ataractic medication was not interrupted.

Mild drowsiness occurred in some patients.

Summary

One hundred chronically psychotic female patients (of whom 10 were tuberculous) who had been institutionalized five months to forty years were treated with promazine, in all but 1 case by mouth. Dosages varied; in cases of long standing larger amounts were required; for the senile and arteriosclerotic, smaller doses were sufficient. Total daily doses were increased in some cases to 1, 1.2, 1.6, 1.8 and even 2 gm. per day without untoward effects. Ninety-one per cent received the medication for six months.

At the time of the study the patients ranged in age from 20 to 76 years. For 27 per cent there was a familial history of mental disease. Seventy-one per cent had received electroconvulsive therapy previously, and 67 per cent had been treated with reserpine.

Promazine was directly responsible for improvement in 83 per cent, of whom 9 were furloughed; 17 per cent were not benefited. Ninety-six per cent of those who had been treated with reserpine responded as well or, in most cases, better to promazine. Sixty-three per cent of the entire series gained weight.

Side effects were remarkably few, consisting mainly of drowsiness.

The recommended maximum daily dosage is 800 mg.

Gratitude is extended Dr. J. S. Tarwater, Superintendent of Bryce Hospital, for making possible this clinical study; and to members of the nursing staff, Recreation and Psychology Departments.

BIBLIOGRAPHY

1. Berger, F. M.: Meprobamate, its pharmacologic properties and clinical uses. *Internat. Rec. Med. & Gen. Pract. Clin., 169:* 184–194, 1956.
2. Fazekas, J. F., Shea, J. G., and Sullivan, P. D.: Ataractics in medical practice. *GP, 14:* 75–81, 1956.
3. Feldman, P. E.: A comparative study of various ataractic drugs. *Am. J. Psychiat., 113:* 589–594, 1957.
4. Gillette, H. E.: Relaxant effects of meprobamate in disabilities resulting from musculoskeletal and central nervous system disorders: Clinical observation of 55 cases. *Internat. Rec. Med. & Gen. Pract. Clin., 169:* 453–468, 1956.
5. Perlstein, M. A.: Use of meprobamate (Miltown) in convulsive and related disorders. *J. A. M. A., 161:* 1040–1044, 1956.
6. Tranquilizing drugs. *J. M. A. Alabama, 25:* 237, 1956.
7. Wortis, J.: Physiological treatment. *Am. J. Psychiat., 113:* 611–615, 1957.

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THE PROCESS OF DEMYELINATION IN THE CENTRAL NERVOUS SYSTEM[1, 2]

IV. Demyelination as a Delayed Residual of Carbon Monoxide Asphyxia

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It has been recognized for some time that certain residual lesions in the cerebral white matter, as a delayed consequence of exposure to carbon monoxide, quite closely resemble those of diffuse sclerosis, one of the primary demyelinating diseases. Because of this resemblance of the essential central changes in these two conditions, a critical analysis of the effects of carbon monoxide in this respect is very worthwhile. This is particularly valuable as a preliminary study of diffuse sclerosis itself. The death of a patient two and a half months after severe exposure to carbon monoxide furnished a rare opportunity to study in detail the alterations found in the cerebral white matter. A previous study on cystic changes in the cerebral centrum under similar circumstances (1) had already laid the foundation for certain concepts which demanded further elaboration. The possession of this well-fixed specimen which showed gross evidence of a spotty demyelination made this further investigation possible.

Review of the Literature

The gross similarity of the residual lesions of carbon monoxide poisoning on the one hand and of diffuse sclerosis on the other was recognized by Cramer (2) as early as 1893.[3] No doubt the occurrence of degenerative changes in the white matter as a delayed residual of asphyxia from exposure to carbon monoxide was noted by others, but no reference to this phenomenon other than that of Cramer was found until Shäffer (15) reported two such cases in 1903. In a woman of 60 years (survival period of 46 days) and in a man of 48 (survival period of 48 days) changes were noted in the cerebral white matter in the form of demyelination. In a well-studied fatal case of carbon monoxide poisoning reported by Stewart (16), irregular demyelination in the cerebral centrum was noted, together with laminar cortical cell loss. These changes had occurred after a survival period of 23 days. It remained for Grinker in 1925 (5) to make a more critical study of these changes in the deep white matter of the cerebral hemispheres in an individual who succumbed 65 days after exposure to carbon monoxide. This damage to the myelin sheaths seemed to be somewhat selective, for the axis cylinders often remained intact. Grinker could find no relation between these foci of demyelination and the regional blood supply. He called specific attention to the similarity of this lesion to that of diffuse sclerosis.

Two additional cases were reported by Strecher, Taft and Willey in 1927 (17), in which the survival periods were 53 and 23 days, respectively. Diffuse changes were found in the cerebral white matter in both instances. In Meyer's case (11), it was noted that these characteristic changes in the myelinated nerve fibers of the cerebral white matter were present microscopically, even though no grossly visible alterations had occurred in the globus pallidus or cerebral cortex. The patient had survived for seven weeks.

Jacob (8) reported a similar case with central demyelination in a man who survived exposure to carbon monoxide for 40 days.[4] In this in-

[1] From the Coroner's Service, Los Angeles County, the Cajal Laboratory of Neuropathology, Los Angeles County Hospital, and the Section of Nervous Diseases (Neuropathology), College of Medical Evangelists, Los Angeles, California.

[2] This study was made possible by a grant from the National Multiple Sclerosis Society.

[3] Becker (*Deutsche med. Wchnschr., 15:* 513, 540, 562, 1889) is sometimes cited as the first to note changes in the cerebral white matter. His patient, a 47-year-old male alcoholic, developed symptoms reminiscent of multiple sclerosis following expsoure to illuminating gas. Insofar as the present writer could discover from Becker's article, this patient did not come to autopsy. Becker did refer, however, to the case of Andral (cited by Simon) in which areas of softening were noted in the left cerebral hemisphere (? cortical *versus* central softening). He also mentioned the case of Leyden in which post-asphyxial symptoms were considered to be due to a resulting pseudosclerosis.

[4] In this study of Jacob's, attention was called to the peculiar "interval syndrome" in which the patient re-

stance, primary demyelination had occurred in the form of small isolated flecks with a tendency to irregular confluence of these foci in the deeper areas. The subcortical association fibers were spared.

In the cases described in 1938 by Hsü and Ch'Eng (7), central changes were found after intervals of four months and four weeks, respectively. In the case with the longer survival period (four months), demyelination was a very patchy affair, while after the shorter interval it was as profound as it was extensive.

Kammy (9) reported a fatal case (his Case 1) of carbon monoxide poisoning in which peculiar patches of "edematous" foci characterized by collections of closely approximated, sharply outlined vacuoles were noted in the central white matter. He believed that these changes were of vascular origin.[5]

Eros and Priestman (4) noted spotty central demyelination in an elderly man who had survived for nine weeks an asphyxial episode incident to exposure to carbon monoxide gas. They noted that the individual areas of demyelination enveloped small blood vessels. These authors came to the conclusion that cerebral changes, including central demyelination, were due first to functional and then structural disturbance in the regional circulation.

Meanwhile, Yant *et al.* (18) had conducted experimental studies on the effects of carbon monoxide on the brain. They found central demyelination in dogs that had been subjected to slow asphyxiation, who survived for a period of 62 to 65 days. Morrison (13) verified these observations of demyelination in experimental animals but concluded that such changes were the result of repeated exposures to carbon monoxide.

Neubuerger and Clarke (14) also noted sharply outlined, central foci of advanced cerebral myelinopathy as a residual of "subacute" carbon monoxide poisoning. The patient had survived for 13 days. They considered some type of vasomotor disorder as the most likely cause of demyelination.

One of the most significant contributions to the subject of demyelination after exposure to carbon monoxide is that of de Lohoczky (10), who reported four cases of delayed death under these circumstances. In all cases, softening of the globus pallidus was found as well as demyelination. The intervals after exposure were three weeks, three and a half months, four months and six years. He noted that the white matter of the occipital lobe was particularly involved, although any portion of the cerebral centrum was occasionally so altered. As well as focal demyelination, he also noted islands of perivascular preservation. This investigator concluded that these changes were the result of some vasomotor paralytic phenomenon and was closely allied to demyelination found after cyanide poisoning. He also believed that there was some association with diffuse sclerosis and concentric encephalitis of Balo.

Dutra (3) noted both softening and demyelination of the white matter in case of carbon monoxide poisoning, death occurring some 18 days after exposure. Both cerebral hemispheres were affected, apparently more so in the parieto-occipital regions. Demyelination was somewhat irregularly distributed with satellite foci about the larger central areas. Microscopically, small islands of sparing were noted about the intact blood vessels. In a second case, small foci of vacuolation were noted in the right occipital centrum after a survival period of four days, a change which may represent a very early stage of this process (see case reported by Kammy [9]).

The essential details of this series of reported cases of demyelination after carbon monoxide poisoning, together with data from the case reported herewith, are shown in table 1.

This survey of the literature on demyelinative changes in the cerebral centrum after exposure to carbon monoxide seems to bring into prominence several important facts. In the first place, this central change is a *delayed* effect, often developing after the individual has apparently recovered from the acute asphyxial episode but always after an interval of three weeks or more. The change begins first in the

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covered consciousness and was able to be about, only to relapse into coma and die. A study of the original reports of cases cited by Jacob indicates that demyelination does not always occur in such cases (exceptions: cases of Cramer, Shäffer and Merguet).

[5] Hallervorden (6) had come to the conclusion some years before that diffuse myelinopathy after asphyxiation from exposure to carbon monoxide was the result of edema of the brain. Evidently this conclusion was based on the observation of these vacuolar spaces in the white matter as described by Kammy.

TABLE 1.—VERIFIED CASES OF CENTRAL DEMYELINATION AFTER CARBON MONOXIDE POISONING*

No.	Author	Age	Sex	Survival Period	Type of Central Change	Distribution
1.	Cramer, 1893	71	Male	34 days	Gliosis of cerebral centrum	Not clearly stated
2.	Shaffer, 1903					
	Case No. 1	60	Fe	40 days	Not stated	Not stated
3.	Case No. 2	48	Male	48 days	Not stated	Not stated
4.	Stewart, 1920	55	Male	23 days	Diffuse	Not stated
5.	Grinker, 1925	58	Fe	65 days	Patchy & diffuse	Both hemispheres
6.	Strecher, Taft & Willey, 1927					
	Case No. 1	30	Fe	53 days	Diffuse?	Both hemispheres
7.	Case No. 2	Adult	Male	12 days	Diffuse?	Both hemispheres
8.	Meyer, 1928					
	Case No. 1	Adult	Fe	7 weeks	Patchy	Widespread
9.	Case No. 2	62	Male	8 weeks	Microscopic only	Not stated
10.	Kammy, 1938				Focal areas of spongy	Cerebral white
	Case No. 1	44	Male	2–3 days	state	matter
11.	Hsü & Ch'Eng, 1938					
	Case No. 1	40	Male	4 months	Spotty & diffuse	Cerebral & cerebellar
12.	Case No. 2	49	Male	4 weeks	App. spotty & diffuse	Cerebral & cerebellar
13.	Jacob, 1939	48	Fe	40 days	Spotty & diffuse	Mostly right hemisphere
14.	Eros & Priestman, 1942	80	Male	9 weeks	Spotty	Not stated
15.	Neubuerger & Clarke, 1945	19	Fe	13 days	Severe confluent	Not stated
16.	de Lohoczky, 1949					
	Case No. 1	58	Fe	3 weeks	Diffuse demyelination	Occipital lobe
17.	Case No. 2	38	Fe	3½ months	Diffuse demyelination	Both hemispheres
18.	Case No. 3	62	Fe	4 months	Diffuse demyelination	Parieto-occipital
19.	Case No. 4	47	Fe	6 years	Diffuse demyelination	Occipital
20.	Dutra, 1952					
	Case No. 1	75	Male	? 24 days	Focal central	Right occipital
21.	Case No. 2	32	Male	18 days	Demyelination & softening	Both hemispheres
22.	Courville, 1957	60	Fe	76 days	Spotty & diffuse	Both hemispheres

* Previously reported by Merguet (12), who did not emphasize demyelination.

deeper portions of the cerebral centrum. This process may take place in either one of two patterns: 1) a mild, at times grossly indiscernible, diffuse demyelination; and 2) a more obvious, grossly visible patchy demyelination which becomes confluent in the deeper portions of the cerebral centrum. The first type of change (i.e., case of Meyer [11]) is evidently of slower evolution and presumably becomes grossly evident after some time has elapsed.

The second process of more profound patchy demyelination appears first as foci of vacuolization ("edematous change" of Kammy), then as circumscribed perivascular patches. Later, these patches tend to become confluent, leading to a diffuse demyelination of the regional white matter. The subcortical U fibers are usually spared even when the myelin sheaths of the centrum have been extensively destroyed. This process is apparently related to cyst formation in the cerebral centrum when it occurs as a shorter and more acute process, as shown experimentally by Yant *et al.* (18). Furthermore, it has been suspected (Kammy [9], Eros and Priestman [4], de Lohoczky [10]) that this process of demyelination in man is somehow related to a secondary circulatory process, but the nature of associated alterations in the blood vessels has not been specifically investigated. This phase of the subject has therefore been undertaken in the preparation of this contribution.

A brief report of the case to be considered and the alterations in the brain will first be given.

Case Report

History. S. M., a white woman of 60 years, was found in a comatose state in a closed room with the gas heater burning (the vent having become obstructed) on the morning of January 1, 1954. Her husband was dead and an adolescent grandson was stuporous but promptly recovered completely. The patient was taken to the St. Joseph Hospital where she gradually recovered consciousness and seemed to be considerably improved when discharged six days after admission. She continued to improve at home for several weeks when she suddenly developed an aphasia about February 12 which became complete in the next three or four days. This was followed by lethargy, urinary incontinence, fever and a slight cough. When readmitted to the hospital on February 17, she was stuporous and responded only to painful stimuli.

Examination. On this occasion the patient was observed to be in a stuporous condition, lying quietly with her eyes fixed in a glassy stare, the mouth wide open. She did not respond to the spoken voice. The pupils reacted to light. The neck was somewhat resistant to flexion. Occasional premature systolic beats were heard over the apex. The blood pressure was 124 systolic, 70 diastolic. Fine moist rales were heard over the right lower lung where increased dullness was noted. The upper extremities were held rigidly in a flexed position, with marked resistance to extension. The lower extremities were rigid in extension.

Course. The patient's condition improved and she seemed somewhat more alert. She was taken home on March 12, but had to be admitted to the Glendale Sanitarium and Hospital three days later because of a temperature of 105°F., associated with profuse perspiration. Because of the history of aphasia and spasticity, a diagnosis of a cerebral vascular accident was made. She was dyspneic with a respiratory rate of 38 per minute; the pulse was 138 per minute; and the blood pressure 84 systolic, 54 diastolic.

The patient went rapidly downhill and died on March 17, 1954, 76 days after the asphyxial episode.

Post-mortem findings. The autopsy was done by Harry L. Deutsch, M.D., Coroner's surgeon, who submitted the embalmed brain to the Cajal Laboratory for further study. He found a moderate generalized arteriosclerosis and congestion of the viscera. The lungs were congested and edematous. A test was made for carbon monoxide but was found to be negative.

The brain appeared to be essentially normal externally except for mild frontal cortical atrophy and minor atherosclerosis of the larger arteries at the base. A slight opacity of the leptomeninges over the frontal and central areas was also noted.

The cerebral hemispheres were cut in a series of coronal sections. Beginning just behind the frontal poles, the white matter in the entire cerebrum presented a mottled grayish appearance. This was due to small individual areas of demyelination which were beginning to fuse with one another. This was particularly evident in the left frontal lobe, and in both parieto-occipital regions where this change was so extensive as to give the centrum a wrinkled appearance. The grayish areas were definitely softer than the regional unaltered white matter. The centrum was not uniformly involved, for fairly large areas seemed free of the change. The two hemispheres were likewise not involved to equal degrees, although both were quite symmetrically affected. The subcortical white matter and the corpus callosum were not involved in this process. These changes are shown in the accompanying figures (fig. 1, A and B), with enlargement to indicate the details of the foci of demyelination.

Section through the lenticular nucleus showed extensive necrosis of the globus pallidus bilaterally. The areas of softening were not symmetrically placed in the nucleus, however.

Section through the thalamus disclosed yellowish foci in the substantia nigra, suggesting focal necrosis of this structure.

Sections through the brain stem and cerebellum disclosed spotty demyelination in the white matter of the cerebellum, though the changes were less marked than in the cerebral hemispheres. The white matter of the brain stem appeared to be unaffected by this process.

Blocks were taken from various portions of the cortex and basal ganglia and stained by the hematoxylin and eosin and cyanin (Nissl) methods and impregnated by the gold sublimate and combined and reduced silver methods. A number of blocks from the central white

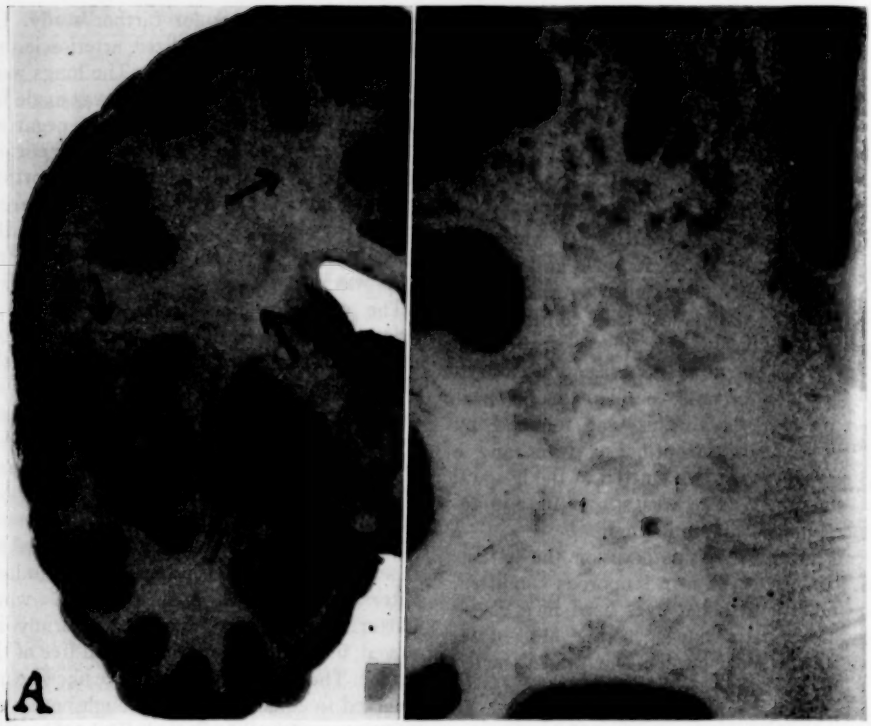

FIG. 1. Photograph of section of right cerebral hemisphere. A. Showing patchy demyelination of white matter and focal necrosis in globus pallidus (arrows). B. Enlargement of white matter of frontal lobe showing details of demyelination pattern.

matter were stained for myelin sheaths by the iron hematoxylin method.

Pattern of demyelination. A study of the myelin sheath preparations under low power magnification brings to light considerable details of the process of demyelination after carbon monoxide poisoning (fig. 2, A to F). It becomes evident that the larger foci of myelin loss are formed by a fusion of smaller foci. These individual foci tend to fuse into irregular conglomerate areas. But about these larger foci small, discrete satellite foci are usually to be observed. As these areas merge, large central zones are formed which extend into the white matter of individual convolutions. Even here such areas maintain for a time a mottled appearance, indicating their origin by fusions of individual foci. On closer inspection, there is a lighter peripheral halo about the foci of demyelination which may prove to be a secondary process. In general the process seems to follow a regular pattern, myelin loss being more diffuse in the deeper portions of the white matter. There are also definite exceptions to the rule. Irregular and sometimes elongated "arms" tend to reach out toward the cortex. These subcortical foci sometimes course along parallel to the preserved arcuate fibers.

A reverse from the process of development of diffuse demyelination can also be made out even under lower magnifications. "Islands of preservation" are to be found in these large foci of pallor. These areas as well as the unaltered subcortical arcuate zones stand out from the cortex and central zones of demyelination. A zone of preserved fibers was also found along the outer border of the putamen in the external capsule.

Under slightly higher magnification, the patchy nature of the irregular peripheral foci of demyelination becomes apparent. These foci are observed to be made up of large vacuolar spaces constituting virtually a "status spongiosus" (fig. 3, A and B). This appearance

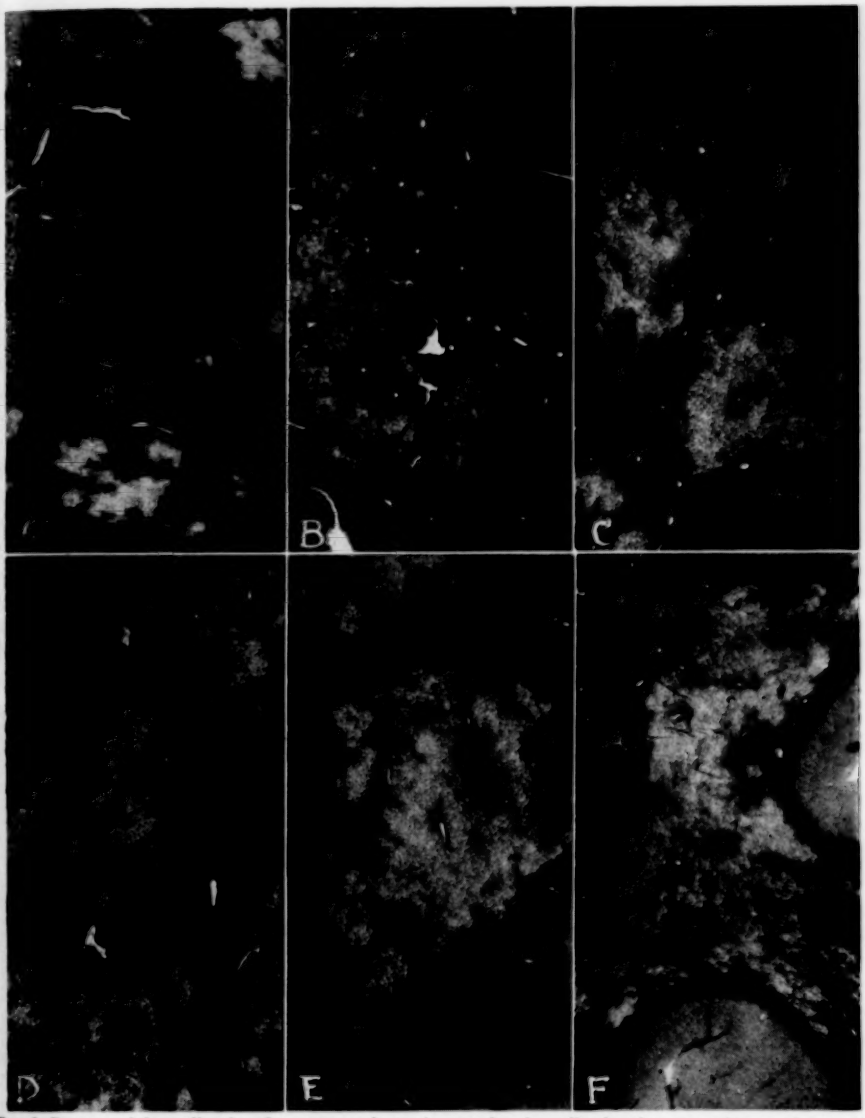

FIG. 2. Pattern of demyelination. Low power photomicrographs of myelin sheath preparations to show various patterns of demyelination, × 4. The tendency for original focal lesions to fuse to form solid areas of demyelination, the sparing of subcortical U fibers, and the preservation of perivascular islands of myelin sheaths (B) are clearly shown.

is particularly striking in the hematoxylin and eosin preparations. The size, number and proximity of these vacuolar spaces seem to be proportional to the degree of myelin loss. However, in areas of longer standing, diffuse demyelination, these vacuoles were no longer conspicuous. At the borders of these areas, vacuolar spaces occurred as isolated and somewhat scattered spaces. "Islands of preservation" were found in demyelinated foci, usually surrounding an intact and open vein. Essentially intact myelinated fibers were found passing through the borders of areas of demyelination but not through the centers of such areas. Here

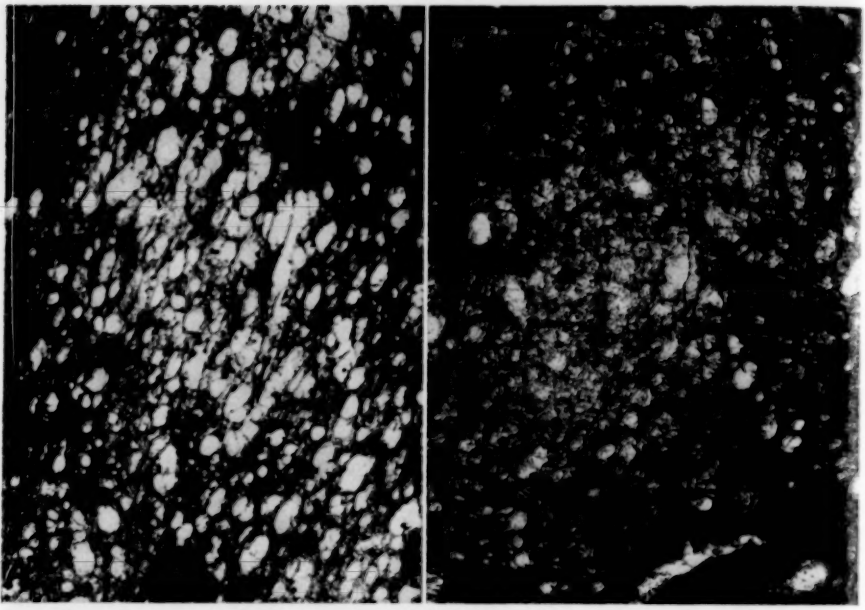

FIG. 3. The nature of basic lesion. Low power view of focal lesion in white matter. A. Focus of numerous vacuolar spaces ("spongy state"). H & E, × 70. B. Focus in same relative area showing destruction of myelin sheaths. Myelin sheath method, × 70.

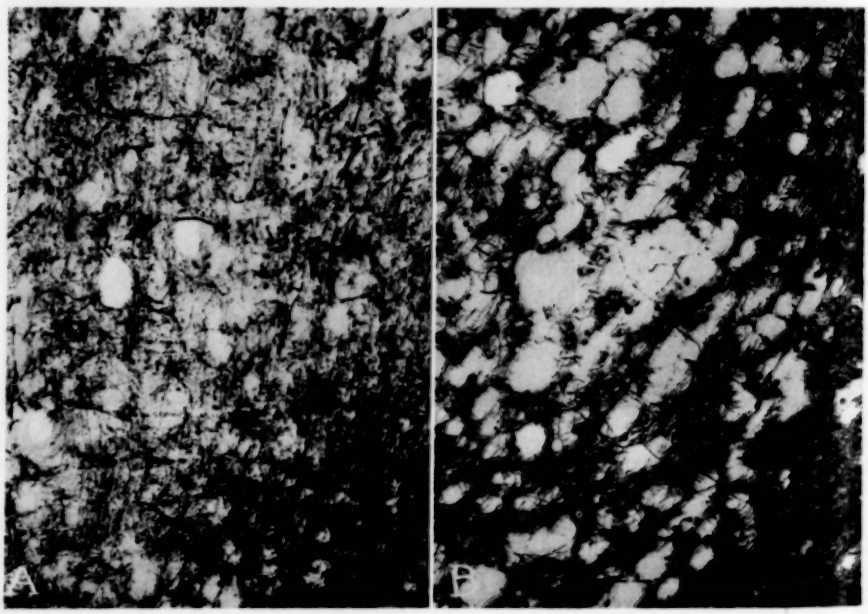

FIG. 4. Relative degree of injury to central nerve fibers in circumscribed focus. A. Marked loss of myelin sheaths by disruption and degeneration. Myelin sheath method, × 125. B. Focus in same area showing less severe loss of axis cylinders (only in actual vacuolar spaces). Reduced silver, × 125.

only small fragments or globules of myelin were to be found.

A study of identical areas of adjacent sections, one stained for myelin sheaths and the other impregnated by the reduced silver method, suggests that the myelin sheaths were more vulnerable to the anoxic-ischemic process (fig. 4, A and B) here taking place. Where only faint shadows of the sheaths were visible or actually absent altogether, axis cylinders were found to present a fairly normal contour and caliber.

Sections through the brain stem failed to demonstrate foci of demyelination but such foci were found in the cerebellar centrum.

Vascular changes. Special attention was paid to the vasculature of these areas of demyelination in both routine and Perdrau preparations. It soon became obvious that the more profound the degree of demyelination the fewer intact arterioles and capillaries were to be found (fig. 5). In those that remained, only minor evidence of endothelial proliferation was occasionally observed.

The long penetrating arteries of the overlying cortex were found at times to be markedly constricted or actually reduced to a solid cord of endothelial cells.

Vascular alterations as demonstrated by Perdrau preparations were especially illuminating. In the demyelinated areas, either the entire segment of the vessel or some part of it appeared to be fading out of the picture. Such vessels presented a pale grayish cast rather than a normal deep black color. Considerable portions of some vessels were found to be undergoing granular degeneration. Other vessels were converted into a solid black, contorted twig without evidence of a lumen. On cross section, these constricted vessels appeared only as a black dot. In some cases only shadowy remnants of vessels could be seen. In others, there was a splitting or delamination of the vessel walls, the channel appearing like a bundle of splinters. In still others, all that remained was a scattered clump of granular debris. In many instances, the lumens of capillaries seen in cross sections were markedly constricted. When such vessels were cut longitudinally, this narrowing of the vessels seemed to be purely a local affair, for some portions of the lumen seemed to have a normal diameter.

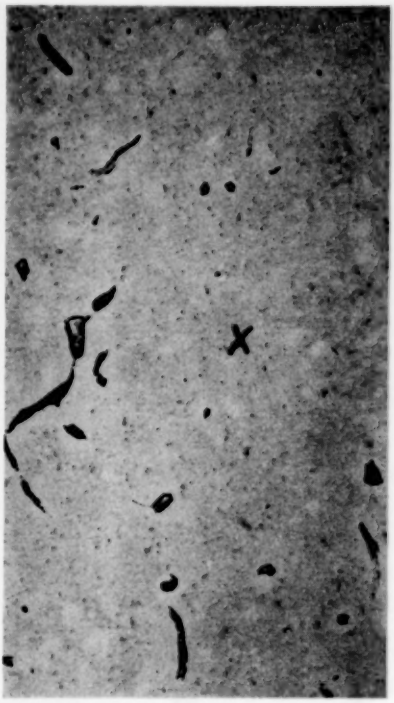

FIG. 5. Photomicrograph of focus of central necrosis showing absence of small blood vessels in this area. Perdrau method, × 70.

In other portions of the vessel, local swellings or actual outpocketings seemed to be present. The cause of this narrowing was not apparent in most instances, although occasionally the vessel appeared to be throttled by fibers of regional astrocytes. This observation was verified by similar situations as seen in gold sublimate preparations.[6] These changes in the blood vessels within the foci of demyelination are illustrated in the accompanying figure (fig. 6, A to G).

The fibrous astrocytes of the white matter in general were found to be undergoing proliferation (fig. 7, A). This process was not very active at this interval, for although giant elongated forms and double cells were seen, they were not numerous. In the foci of necrosis, these cells were found to be undergoing re-

[6] Although an incidental observation, the blood vessels shown in the gold sublimate preparations also seemed to prove this point. Unusual variations in diameter of the vessel within short spans in the form of local constrictions and swellings as well as outpocketing were noted.

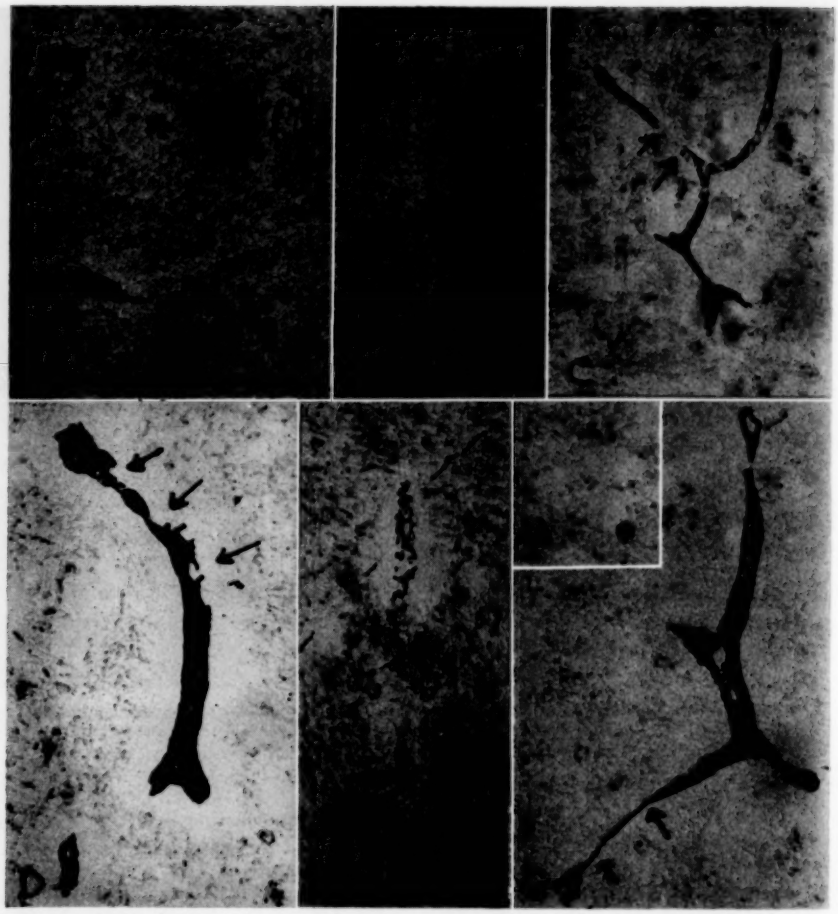

FIG. 6. Changes in individual vessels in foci of demyelination. All Perdrau preparations. A. Granular necrosis of blood vessels (arrows), × 125. B. Collapsed blood vessel forming a more or less solid "string", × 125. C. Partial necrosis (focal) of small blood vessel, × 125. D. Partial focal disintegration of small arteriole, × 275. E. Complete necrosis of small arteriole, × 125. F. Cross section of obliterated blood vessel appearing here as a black dot (arrow), × 275. G. Partial collapse (arrows) of branch of small arteriole, × 275.

gressive change. Characteristic spider and ameboid forms and unipolar and bipolar elements were commonly seen. The protoplasmic astrocytes of the cortex were also undergoing transformation into the fibrous variety.

As has been observed in other instances of cerebral anoxia, the microglia and especially the oligodendroglia attract silver very poorly and cannot be readily demonstrated. Only faint outlines of acutely swollen oligodendroglia could be made out even in well-preserved portions of the white matter. It is important to note, however, that in the areas of focal necrosis, the oligodendroglia have disappeared, judging from the absence of their characteristic small round nuclei (fig. 7, B). This is in contrast to the astrocytes which persist in these areas even though in crippled form. It would therefore appear that the oligodendroglia were easily crippled by anoxia, and are very vulnerable to ischemia.

Alterations in the cerebral gray matter. The cerebral cortex appeared to be essentially unaltered as far as its architecture was concerned. It seemed to be friable or granular in some areas, and the perivascular and pericel-

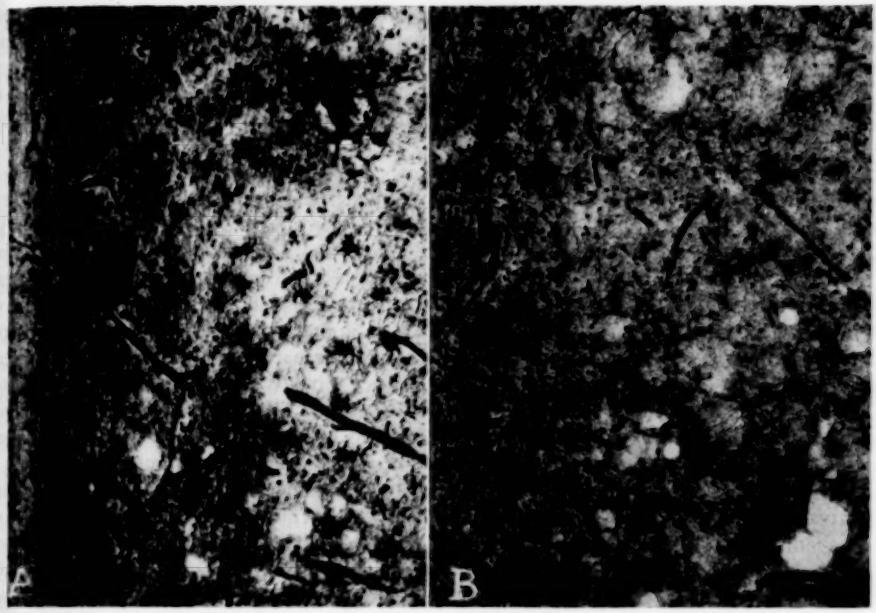

FIG. 7. Reaction of interstitial elements. A. Showing mild proliferation of fibrous astrocytes about margin of demyelinated focus, with giant glial cells in margin of degenerated focus. Gold sublimate, × 125. B. Marked loss of oligodendroglia (with small dark nuclei) in focus of demyelination. Penfield's combined method, × 75.

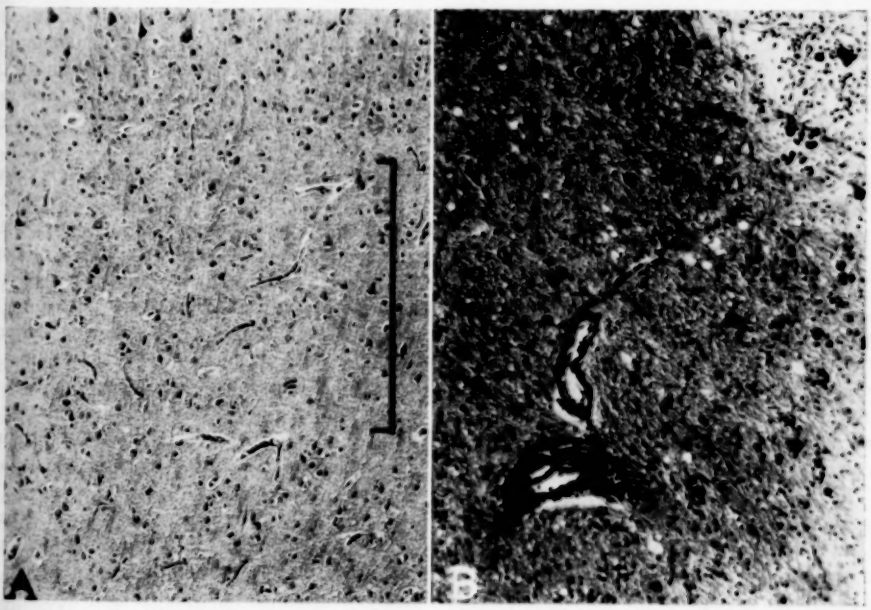

FIG. 8. Alterations in cerebral gray matter. A. Low power view of cerebral cortex showing patchy loss of nerve cells more marked in intermediate layers. H & E, × 75. B. Section from globus pallidus at border of necrotic center showing calcium and/or iron in blood vessels. H & E, × 75.

lular spaces were irregularly widened. The interstitial elements (astrocytes in particular) were apparently undergoing early direct cell change. Many of the larger nerve cells contained collections of lipoidal pigment, others showed loss of tigroid material, while still others presented evidence of early pyknotic change. All appeared somewhat granular, and their nuclei frequently contained vacuoles. The nerve cells of the intermediate zone (Laminae III to V) in some regions were found to be undergoing progressive deterioration as indicated by the presence of "ghost cells" and the patchy decrease in number of these cells (fig. 8, A).

The globus pallidus of the lenticular nucleus showed a general widening of the perivascular spaces. About some of the vessels small collections of lymphocytes could be observed. Areas of status spongiosus and focal necrosis, the latter containing compound granular corpuscles, scattered lymphocytes, remnants of blood vessels and a number of darkly staining nodular masses (probably calcospherites), were also evident (fig. 8, B). The larger blood vessels were marked by one or more rings of darkly staining material (iron and/or calcium), while the smaller ones had one or more isolated or accuminate masses of this same material. The larger nerve cells of this body frequently contained lipoidal pigment, while the tigroid material was largely absent. The smaller cells seemed to be decreased in number. The interstitial elements, both astrocytes and oligodendroglia, appeared to be increased in number.

Comment

This case has served to reemphasize the fact that widespread demyelination, at first patchy then becoming diffuse, does occur as a delayed residual of carbon monoxide "poisoning" as well as other forms of cerebral anoxia. The occurrence of vascular changes, suggestively functional at first (vasospasm), is followed by secondary degenerative changes in the arteries of the white matter with consequent disappearance of the capillaries in the necrotic foci. There is reason to believe that these changes are precipitated by vasospastic processes set up by anoxemia acting on the vasomotor center and/or the peripheral vasomotor fibers of the cerebral arteries. Specifically, the long penetrating cortical arteries seem to be predominantly affected, hence permitting ischemic changes to occur in the central and subcortical white matter. The residual changes found in this case seem best accounted for on this basis.

General Considerations

Among the several possible structural effects in the brain of exposure to carbon monoxide, one involved predominantly the cerebral, and sometimes the cerebellar, white matter. These changes occur only when the patient survives for an appreciable interval the asphyxial episode. Three patterns of central change appear to be possible. When exposure has been severe, there may be a gross breakdown of considerable portions of the white matter with cyst formation (1). A much more common finding is a patchy, leading to a more diffuse, demyelination which is quite evident grossly on section of the brain. The third and less conspicuous change, demonstrated only on myelin sheath preparations, is a diffuse, centrally placed, nebulous type of demyelination. By its very nature one would anticipate a lesion with an essentially slower evolution, one which could come to full flower only after many months had elapsed. The case reported herewith seems to be an example of patchy demyelination leading to diffuse change by fusion of the individual foci. The findings had developed during a survival period of 76 days after exposure to carbon monoxide gas.

The matter of demyelination after anoxia is not only a matter of interest in itself, but also furnishes a standard of comparison for other demyelinating disorders whose etiology is unknown. It is well therefore to review the essential characteristics of the pathology of anoxic demyelination. The following features are noteworthy: 1) the initial lesion in the form of perivascular focal demyelination, a change found typically in the white matter of individual gyri, 2) the formation of diffuse demyelination by fusion of individual foci, found typically in the deep centrum, 3) the tendency to spare the subcortical arcuate fibers, 4) a decrease in number of capillary blood vessels proportionate to the degree of demyelination and a collapse and actual ultimate disappearance of the regional arterioles, 5) a decrease in number of oligodendroglia in

the degenerative foci, 6) the indication that demyelination *per se* is a process secondary to vascular change with ischemia, and 7) the "islands of preservation" about intact blood vessels in the periphery of the lesion. To say the least, the comparison of these details of the pathology of anoxic demyelination with the characteristic findings in diffuse sclerosis is certainly quite striking. However, this precise analysis must await a future contribution in this series now in preparation.

It is important in this connection to point out three important features of this study which seem to have some bearing on the problem of the demyelinating diseases of unknown etiology: 1) the relation of the demyelinating process to vascular change, 2) the apparent secondary nature of myelin loss, and 3) the susceptibility of the oligodendroglia to ischemic changes. In the discussion of the vascular changes in the areas of central change in the case reported herewith, two features were pointed out which seem to be significant. The first of these changes was a disappearance of the capillaries in the foci of demyelination. One might argue that this was incident to some noxious effect of the anoxic process. On the other hand, the irregular constriction, collapse and disappearance of the lumen and the progressive fading out of the arterioles suggest that these two changes are closely allied, the first probably consequent to the second. It seems quite a consistent finding that the reduction in number of capillary vessels seems to be at least roughly proportional to the extent and degree of demyelination.

The basic cause of arterial change is not clear on the basis of microscopic examination alone. One might safely assume that this process, probably functional at least in the beginning, results in a progressive ischemia. This is first evident in the deeper portions of the cerebral centrum, presumably in the form of small foci of perivascular necrosis. As this process is continued, it spreads toward the more superficial portions of the white matter, the demyelinating change becoming diffuse with fusion of the foci in the deeper centrum, manifesting the perivascular pattern at the periphery. The functional process becomes manifested ultimately by structural changes in the nutrient arteries, as found in this case by irregular constrictions and occlusions in the vessel wall. Such changes could only accentuate the ischemia already begun on a functional basis.

The second significant feature brought out by this study is the apparent nature of demyelination. In the past there has been a conclusion on the part of some that this process in some of the so-called demyelinating diseases was a primary process, the result of some metabolic disorder affecting the formation of myelin. Insofar as the anoxic-ischemic form of demyelination is concerned, it seems clear that demyelination is a secondary process. As in the case of other structural entities, the myelin of the nerve sheath is affected by an interruption of the blood supply. The myelin is more sensitive than the contained axis cylinder, but this structure is ultimately damaged also by the same process.

The third observation is closely allied to the second. The writer has long observed that it is extremely difficult to demonstrate the oligodendroglia in individuals dying of asphyxia. This is particularly the case of individuals who have survived more than a few days. For some reason or other the cell bodies fail to attract silver under these circumstances. It is evident, however, that these cells do survive an anoxic insult, for the nuclei appear to be perfectly intact. On the other hand, in the areas of focal necrosis (spongy areas) these cells have completely disappeared while the astrocytes have managed to survive. This observation would tend to suggest that the absence of oligodendroglia from foci of demyelination in diffuse sclerosis and multiple sclerosis is more likely an effect of the causative process than the absence of these cells is the cause of myelin degeneration. It also suggests that the cause of these disorders is not likely to be found as a disturbance of enzyme activity.

Summary and Conclusions

In this study of a series dealing with the process of demyelination, the changes in the cerebral and cerebellar centrums have been noted following severe asphyxia incident to carbon monoxide. Such changes are "delayed" in the sense that a suitable time interval must elaspe after the asphyxial episode, 76 days in

the case herein reported. The characteristic alterations constituting the residual lesions were 1) perivascular demyelination as the initial lesion, leading to 2) diffuse demyelination by confluence of these individual foci, 3) the tendency to spare the subcortical arcuate fibers, 4) vascular changes in the form of a decrease in number of capillaries in the degenerative foci, and a progressive collapse and disappearance of the arterioles in the affected area, 5) a decrease in the number of oligodendroglia in the degenerative areas, 6) the obvious secondary nature of loss of myelin being an effect of ischemia and 7) the occasional occurrence of islands of preservation in the periphery of the lesion.

The findings are significant in their remarkably close correlation to the changes observed in diffuse sclerosis. But in addition, there was found evidence of support for the conclusion that demyelination *per se* is very likely a secondary process, probably never a primary one. It is also very likely that the loss of oligodendroglia in areas of demyelination (i.e., the plaques of multiple sclerosis) is due to their sensitivity to ischemia (local anoxia) and bears no cause-effect relationship to the process of demyelination.

BIBLIOGRAPHY

1. Courville, C. B.: *Contributions to the Study of Cerebral Anoxia.* Los Angeles: San Lucas Press, 1953.
2. Cramer, A.: Anatomischer Befund im Gehirn bei einer Kohlenoxydgasvergiftung. *Centralbl. allg. Path., 2:* 545, 1891.
3. Dutra, F. R.: Residua of acute carbon monoxide poisoning. *Am. J. Clin. Path., 22:* 925, 1952.
4. Eros, G., and Priestman, G.: Cerebral vascular changes in carbon monoxide poisoning. *J. Neuropath. & Exper. Neurol., 1:* 158, 1942.
5. Grinker, R. R.: Über einem Fall von Leuchtgasvergiftung mit doppelseitieger Pallidumerweichung und schwerer Degeneration des Tiefen Grosshirnmarklagers. *Ztschr. ges. Neurol. u. Psychiat., 98:* 433, 1925.
6. Hallervorden, J.: Kreislaufstorungen in der Ätiologie des angeborenen Schwachsinns. *Ztschr. ges. Neurol. u. Psychiat., 98:* 433, 1925.
7. Hsü, Y. K., and Ch'Eng, Y. L.: Cerebral subcortical myelinopathy in carbon monoxide poisoning. *Brain, 61:* 384, 1938.
8. Jacob, H.: Über die diffuse Hemisphärenmarkerkrankung nach Kohlenoxydvergiftung bei Fällen mit klinisch intervällerer Verlaufsform. *Ztschr. ges Neurol. u. Psychiat., 167:* 161, 1939.
9. Kammy, E.: Beitrag zur Histopathologie und Histogenese der Sauerstoffmangelschadigung der Gewebe mit Berücksichtigung des Gehirns. *Beitr. path. Anat., 100:* 248, 1938.
10. de Lohoczky, T.: Du mécanisme physiopathologique des lésions centrales de l'intoxication oxycarbonée. *Acta neurol. et psychiat. belg., 49:* 488, 1949.
11. Meyer, A.: Über das Verhalten des Hemisphärenmarks bei der menschlichen Kohlenoxydvergiftung. *Ztschr. ges. Neurol. u. Psychiat., 112:* 172, 1928.
12. Merguet, H.: Ein Fall von Kohlenoxydvergiftung mit choreiformer Bewegungsstörung. *Arch. Psychiat., 66:* 272–282, 1922.
13. Morrison, L. R.: Histopathologic effects of anoxia on the central nervous system. *Arch. Neurol. & Psychiat., 55:* 1, 1946.
14. Neubuerger, K. T., and Clarke, E. R.: Subacute carbon monoxide poisoning with cerebral myelinopathy and multiple myocardial necrosis. *Rocky Mountain M. J., 42:* 29, 1945.
15. Shäffer: Ueber eine noch nicht beschreibene Veränderung des Nervenmarks der zentralen und peripheren Nervenfaser: zwei Fälle von akuter CO-Vergiftung. *Centralbl. Nervenh. u. Psychiat., 26:* 485, 1903.
16. Stewart, R. M.: A contribution to the histopathology of carbon monoxide poisoning. *J. Neurol. & Psychopath., 1:* 105, 1920.
17. Strecher, E. A., Taft, A. E., and Willey, G. E.: Mental sequelae of carbon monoxide poisoning with reports of autopsy in two cases. *Arch. Neurol. & Psychiat., 17:* 552, 1927.
18. Yant, W. P., Chornyak, J., Schrenk, H. H., Patty, F. A., and Sayers, R. R.: *Studies in Asphyxia.* Washington: Government Printing Office. U. S. Public Health Bulletin, No. 211, 1934.

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PSYCHOPHYSIOLOGIC RESISTANCE IN INSULIN COMA THERAPY

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Introduction

One of the difficulties and dangers inherent in insulin coma therapy is physical resistance of the patient to even very high insulin doses. If the patient is to have a smooth course of therapy, producing enough deep comas to bring about the desired treatment effects, those factors which increase this resistance must be eliminated where possible, and those factors which decrease this resistance must be encouraged. Obviously, if psychologic states should affect a patient's response to physical treatment, this becomes a factor in treatment which must be regarded with as much interest as the patient's dosage of insulin. Moreover, if the psychology is helping to maintain high physical resistance, measures must be taken to change the psychologic state (13). This lies within the realm of psychotherapy.

Reports of some workers in the field of somatic therapies indicate that there are indeed psychologic effects operating in the physical treatment scene. Observations by Peterson of a series of 13 patients treated with CO_2 revealed that improvement occurred chiefly in those patients who had requested the treatment to be continued (16). In another study of CO_2 treatments it was found that anxiety acted as a deterrent to the treatment, and reassurance and re-education had to be instituted by the therapist to facilitate the therapy (12). In the field of electroconvulsive therapy also, the reactions to the therapy seem to be in accord with mental patterns (11).

In addition, it has been stated many times that physical treatment procedures used with psychiatric patients have psychologic meanings for them as well as physical effects (6). That is, the psychology of the individual reacts not only to the physiologic stress of the treatment but to the affective meaning of that treatment for the individual. The affective response of the patient depends not merely on the physiology but on the psychology plus the physiology (2). Thus, an unvarying physiological treatment may be associated with varying psychological response in an individual depending upon his total state. And conversely, it seems likely that the affective state of the patient may modify the physiologic responses to treatment (17).

Psychologic patterns may operate on the physiology of the individual in many ways. Both the cerebral cortical and the limbic systems may be important in this complex. Intellectual and affective activities could cause changing blood pressure by activity mediated via the hypothalamus medulla and autonomic nervous system. In the same way psychologic stress may stimulate the adrenal medulla (14, 15). Work by Funkenstein (7, 8) has indicated adrenaline-like activity to be associated with anger, depression, and anxiety. However, the possible mechanisms which relate physical stress and specific affects are not in the scope of this paper.

The present study has been undertaken to determine if any correlation exists between a mental resistance to the idea of insulin therapy and actual physical resistance to the insulin itself. It was also felt that the role of psychotherapy in insulin and some of its aims and goals might be clarified by such a study. In addition, some factors operating in the initial attitude of patients might come to light.

The study was undertaken on a 13-bed insulin unit and afforded an opportunity for very close work with each patient. Moreover, each subject was personally known from his initial interview until his eventual disposition, and has been seen in periodic follow-ups since then. Because of the smallness of the unit and the length of time normally consumed by a patient in insulin therapy, the study was limited in the number of subjects. However, in a study of this type it is of doubtful value to reduce treatment to vast numbers of statistics when those statistics often arise from rather subjective impressions.

Method of Study

A total of 27 patients undergoing deep insulin coma therapy was selected for this study.

These included 15 women and 12 men with ages ranging from 20 to 50. With one exception all patients in the study were diagnosed as schizophrenic reactions. The majority (19) were classified as paranoid schizophrenic; one patient was classified as psychotic depressive reaction; the remaining 7 were in the other schizophrenic classifications. All patients had been recommended by members of the psychiatric staff for insulin therapy. Five of the patients had had insulin coma therapy previously, and 16 of the 27 had had one or more previous series of electroconvulsive treatments.

Insulin coma therapy (ICT). Whenever possible patients were kept in deep insulin coma therapy until they had improved enough to maintain themselves outside the hospital or until they had received a maximum of 60 hours of deep coma. The longest stay of any patient in the group was 13 months on the insulin unit. Successes of treatment in patients were rated depending upon their discharge from the hospital. It should be emphasized that the purpose of this study was to attempt a determination of the role played by psychologic and physiologic factors in obtaining maximum success in insulin therapy and not to determine slight degrees of change or improvement in patients undergoing this type of therapy.

Psychotherapy. Patients were seen in two group psychotherapy sessions per week and in individual psychotherapy in varying numbers of hours per week. The aims and directions of the psychotherapy sessions with individuals will be discussed later. The group sessions were conducted with members of all four classifications present at each group sitting.

Grouping of patients. Patients were placed in one of four major groups. Group I included those patients who initially felt that insulin was a hopeless therapy and did not change this attitude during their stay on the unit. Group II consisted of those patients who came to the insulin unit feeling that the treatment was the preferential treatment in their case and felt that they would benefit by receiving it. Group III was made up of those patients who never expressed any definite attitude toward their insulin treatment or toward any other type of treatment. In group IV were placed those patients who arrived on the unit feeling that insulin was a useless or detrimental treatment and later, in the course of therapy, changed their attitude to one of optimism about the possible benefits of treatment. As the study progressed this group was a constantly enlarging one.

No grouping was made of patients by psychiatric syndromes. Classification was strictly on the basis of attitude toward therapy. Determination of the attitudes of the patients was on a verbal level and was developed over the initial interviews and the subsequent psychotherapy sessions.

Determination of physiologic resistance. Ratings of bodily resistance were carried out under the following four points: average daily dose necessary to produce coma; average number of minutes of coma per twenty treatment days; average number of reactions per twenty treatments; length of stay in number of days. These four categories seem to provide a good profile of the physiologic insulin resistance of the patient.

General Observations

Those patients who come to the Insulin Unit believing it to be a last ditch type of treatment (Group I) respond very poorly during the therapy. They show a high physiologic resistance to the insulin itself, and in addition they gain far less improvement in the same number of coma hours than patients who accept insulin as a valid treatment in their own individual case. Among these continually resisting patients are found especially patients who have had numerous types of other treatments for a long period of time and who are sent by their ward physician to insulin because everything else has been tried unsuccessfully. This attitude often has somehow been communicated to the patient by his physician. Feeling cast off or rejected, these patients are unable to understand what good can come of undergoing so many needles and the other painful facets of insulin coma therapy. When they react to the treatment situation, they do so with such fear and dislike that they are blind to the possible benefit which may accrue to them.

Patient #4. A 43-year-old white female admitted to the hospital on May 7, 1955, presenting a picture of paranoid schizophrenia subacute in nature. There was

manifest disturbance of the thought processes, inappropriate affect, and delusional thinking. The patient was first given drug therapy and some supportive psychotherapy followed by a course of 20 electroconvulsive treatments. She showed improvement in the next two months and was allowed out of the hospital in July, 1955. The improvement did not maintain itself, however, and it was necessary to return her to the hospital in October, 1955. She was admitted to the Insulin Unit on March 12, 1956. Upon admission she presented a fixed flowering delusional system involving her husband and family. At the initial interview she expressed complete hopelessness in the benefits that any therapy might give to her. She felt that insulin was being recommended because it was the last thing the hospital could possibly do to her and that it was more for the benefit of the doctors than for her. She stated that she was willing to undergo insulin therapy but hoped that when it was finished, she could be placed in some nice chronic building and left alone. She did not seem unduly afraid of the treatment. The patient was started on insulin on March 26, 1956, and achieved her first deep coma on her eleventh treatment day with a dosage of 800 units. Thereafter her response physiologically was erratic and difficult to predict. She had numerous secondary reactions and special symptoms which necessitated suspension of a daily dose. She missed treatment on more than 50 per cent of the treatment days. On days on which treatment was given, she achieved comas in less than half. The comas were marked by extreme difficulties. Breathing was often of a poor quality as was the pulse. She completed 46 hours of coma in 95 treatments. Treatment period covered a span of 225 days and was broken off November 5, 1956. She had a weight gain of 44 pounds. Her mental status revealed little change throughout the treatment, and at the end she presented a picture much the same as when she was admitted to the hospital. She was transferred to a chronic ward where she remains at present. The physiologic response would be characterized as poor and erratic. The psychologic response was nil. Her attitude toward therapy was of the deepest pessimism throughout and never varied during her sessions in psychotherapy.

Comment. This patient had high daily insulin doses with achievement of comas in less than half the treatments. The number of secondary reactions are high and the stay on the unit very lengthy even though she was transferred from it before she reached a maximum number of hours. This is a profile of high physical resistance to insulin, and it marks nearly all the patients of group I. The attitude of resistance was present before the institution of therapy and remained throughout the treatment course. This too is a characteristic of the patients in the first group.

The next two cases are illustrative of the patients in group II which is the group most nearly the reverse of the above group. These patients have accepted insulin as genuine treatment, or even as the treatment of choice in their case. Though they may dislike the uncomfortable or dangerous aspects of treatment, they wish to undergo it for the real or imagined benefits which they may gain. Patients who come to insulin with little or no previous treatment often fall into this group, but, surprisingly, some patients in this category have had extensive prior treatments before ICT is instituted. It is often found that these patients have had explanations of the methods, intent, and purpose of ICT before they have been interviewed by the insulin therapist. Insulin has been presented to them as an alternative form of therapy rather than as the last type left to be tried.

Patient #26. A 41-year-old white male admitted to the hospital on April 9, 1956, presenting a picture of acute paranoid schizophrenia. The patient was first given drug therapy with tranquilizers and supportive psychotherapy. In the first month of hospitalization he showed good improvement with remission of his acute and disturbing delusional system. Following this he showed a return of symptoms, marked by increasing suspiciousness and a growing belief that his former system of delusions had some factual basis. The patient was transferred to the insulin unit on August 22, 1956. During the initial interview he expressed a need of further help and, after insulin therapy had been explained to him, seemed to feel that it would be suited to his case. Although the dangers of therapy were outlined for him, he did not appear unduly afraid. By the time his initial laboratory workup was completed, he seemed confident that he would benefit by the treatment and was anxious to start. He began insulin on August 24, 1956, and achieved his first deep coma on the tenth treatment day with a dosage of 1000 units. Thereafter he went into comas on increasingly lower dosages of insulin and was stabilized at an average daily dose of 360 units. In the next 34 treatments he completed more than 24 hours of deep insulin coma, and therapy was broken off November 1, 1956. During this time he missed only 3 treatment days and had almost no secondary reactions. His weight gain was 31 pounds. By the end of 10 comas the patient had lost all faith in the reality of his previous delusional systems and had begun examining his markedly suspicious attitudes. By the end of 20 comas this air of suspicion had largely disappeared, and he remained free of the admitting symptoms from that time onward. His family and wife described him as being better to get along with than before the onset of his illness. Checkups at the outpatient clinic reveal that his mental status is unchanged since discharge on November 3, 1956. The physiologic response to insulin was very good. The psychologic response also was good. His attitude toward the therapy was excellent throughout, and this preceded actual institution of therapy.

Patient #14. A 23-year-old white female admitted to the hospital on November 6, 1955, presenting a picture of acute undifferentiated schizophrenia. The patient was first given drug therapy with tranquilizers and some supportive psychotherapy, and then several courses of electroconvulsive therapy. She received a total of 105 ECT's. Following a course of ECT she would go into good remission, only to relapse within about a one-week period. The patient was transferred to the Insulin Unit on August 21, 1956. Upon admission she showed little in the way of symptomatology. At the initial interview she expressed hopes that insulin therapy would be the treatment which would grant her the improvement necessary to allow her to go home. She revealed some superficial knowledge of insulin and a belief that it was a good treatment in cases of her sort. Apparently this had been imparted to her by her ward physician. She seemed concerned about the possible mischances of this type of therapy but did not fear it and was eager to start. The patient was started on insulin on August 24, 1956, and achieved her first coma on her sixth treatment day with a dosage of 300 units. Thereafter she went into comas regularly on increasingly lower doses of insulin and during the last part of her therapy was on an average dose of insulin of only 70 to 80 units daily. She completed 40 hours of deep insulin coma in 50 treatments, and therapy was broken off on November 20, 1956. During the course of treatment she missed only 5 treatment days and had almost no secondary reactions. Her weight gain was 23 pounds. By the end of the fourth coma the patient was in full remission of her symptoms and remained so throughout the treatment period and the two weeks following before she was discharged. Checkups reveal her mental status unchanged to this date. In psychotherapy she continued throughout to exhibit a firm belief that the treatment would be good for her and never exhibited any ideas of its being a "last ditch" treatment. Her physiologic response to the therapy can be described as excellent. The psychologic response can also be characterized this way. Her attitude toward the therapy was excellent all the way through and was marked by optimism, and this attitude preceded institution of therapy.

Comment. These two patients had relatively low daily doses of insulin with achievement of comas on almost every treatment day. The number of secondary reactions is low, and the stay on the unit quite brief. This is a profile of low physical resistance to insulin, and it is found uniformly among patients in group II. The patients had very accepting attitudes toward the therapy at the time it was instituted. Concomitant with the good physical performance was rapid remission of the symptomatology seen upon admission. The psychologic apparatus of the patient seems set at acceptance permitting a good physiologic response which in turn promotes improvement in the mental status.

The next case presents a picture of the course of a group III patient. These patients expressed no attitude toward therapy although this apathetic outlook by no means applies to their approach to the total environment. These cases include some acute psychotic processes. Some of the patients participated in the activities around them, but in the area of therapy they maintained a blank attitude.

Patient #1. This 20-year-old white female was admitted to the hospital January 4, 1956, presenting a picture of an acute undifferentiated schizophrenic reaction with elements of both catatonic and paranoid reactions. She was placed on drug therapy and some intermittent psychotherapy. Following this she underwent a course of 9 ECT's with reported improvement. The patient was transferred to the Insulin Unit on February 14, 1956. Upon admission the patient was seclusive and withdrawn and exhibited thought disorder. In initial interviews she expressed no views about insulin therapy, or, indeed, about any type of therapy whatsoever. Insulin therapy was explained to her without eliciting any comment. It seemed that the concept of treatment or even hospitalization was beyond her grasp. Throughout her treatment course this attitude was maintained. She was started on insulin on February 20, 1956, and achieved her first coma on her tenth treatment day with a dosage of 800 units. Thereafter she went into deep comas in a somewhat erratic way. She would have a long period during which she would respond well physiologically, missing very few treatments and achieving coma every day, followed by an equally long period marked by missed treatments, secondary reactions, and treatment without coma. She completed 70 hours of deep coma in 139 treatments on an average dose of 200 to 220 units. Her weight gain was 20 pounds. During the entire course she maintained her withdrawn, seclusive, disorganized state. In the individual and group psychotherapy sessions she referred to the treatment at no time and never seemed to be occupied with it. Attempts to discuss therapy with her always resulted in failure. Her physiologic response can only be described as erratic. At times it was excellent and at other periods it was very poor. The psychologic response was nil. The treatment was broken off on November 31, 1956, and the patient subsequently transferred to a ward in a chronic building where she remains at present, still with the picture of a severely disorganized schizophrenic.

Comment. Like the group II patients these patients exhibited a profile of low physical resistance to insulin coma. The daily doses were low, the numbers of reactions low, and the coma time in each treatment long. However, they rapidly gained the maximum number of hours with little change or improvement in their mental status. The change in their psy-

chosis was in accord with their mental set. There was no attitude and no change.

Comment. Group IV patients are the "mixed" group of patients. These patients who feel that insulin is a hopeless course of therapy when they arrive on the unit, but who change during treatment and adopt a more optimistic attitude about their insulin therapy, show a striking change in lowered physical resistance to insulin with subsequent improvement in the mental status. The change in physical resistance follows a change in mental attitude, and the improvement noted occurs after both of these changes have taken place.

Patient # 9. A 30-year-old white male admitted to the hospital on March 22, 1954, presenting a picture of acute schizophrenic reaction, paranoid in type. The patient was placed on a series of ECT and received a total of 24 of these treatments. He was reported to have shown a lessening of his symptomatology and was placed on extended visit in November, 1954. He returned to the hospital in August, 1955, showing a complete return of his symptoms in an even more intense state. He was then given drug therapy with tranquilizers and some intermittent psychotherapy. During February and March, 1956, the patient went on escape three times and generally created disturbances on the wards. He was transferred to the Insulin Unit on April 16, 1957. In the initial interviews the patient expressed resentment at being transferred to the unit and seemed to feel that he had been placed there as a means of getting him off his former ward. He related a long tale about some old leg injuries which he offered as evidence that he would be unable to withstand the insulin treatments. He expressed grave doubts as to the value of insulin or any other type of shock treatment. He offered as evidence the poor results from his course of ECT. There was a delay in obtaining permission for therapy, and this patient was not started on treatment until April 24, 1956. He achieved his first coma on the eleventh treatment with a dosage of 800 units. During the first 20 treatments his physiologic response was erratic and generally poor. He missed treatments on one-third of the treatment days, often having severe secondary reactions, elevated blood pressures, etc. On those days on which he went into comas, he had a more difficult time than the other patients. During this period he was given psychotherapy both on a group basis and on an individual basis. The psychotherapy was directed toward an understanding of insulin therapy and the types of cases in which it is usually used. In group the attitude of the patient gradually changed, and he became somewhat of a defender of the use of insulin, often freely giving his opinion that certain of the patients were benefiting by it. Toward the end of the first 20 treatments he expressed a desire to continue with the treatments because they might possibly be of help in his own case. At the end of the first 20 treatments he had achieved a total of five and one-half hours of deep coma. The patient received an additional 18 treatments with a marked change in his response. He went into coma regularly. He continued to miss treatment days with about the same frequency as before. His dosage which had been between 350 and 400 units dropped to an average of 200 units. In the last 18 treatments he gained 14 hours of deep coma time to contrast sharply with the time gained in the first 20 treatments. Treatment was broken off on July 13, 1956. At that time he exhibited almost none of the admitting symptoms. He was placed on extended visit on July 26, 1956, and has remained outside the hospital since that time. Checkups from time to time reveal his mental status to approximate that of the discharge date. The physiologic and psychologic response to insulin can be described as having two phases: the first, marked by poor response; the second, marked by an excellent response in both spheres. The second phase followed closely upon an observable change in the patient's attitudes and concepts of what insulin therapy could mean in his own case.

Patient # 15. A 49-year-old white female admitted August 11, 1956, presenting a picture of psychotic depressive reaction marked by acute generalized anxiety. She was placed on drug therapy with both tranquilizers and sedatives. She was also seen regularly in psychotherapy sessions by her ward physician. This doctor felt that she would benefit from a course of insulin therapy and, during his hour with her, would attempt to show her the logic of such therapy in her case. The patient remained highly skeptical at best. Nevertheless she was transferred to the Insulin Unit on August 21, 1956. During the initial interviews she expressed resentment at the transfer and was nonaccepting of the idea of any type of therapy other than massive sedation or a release to her own home. She offered numerous somatic complaints as proof that she would not be able to withstand the rigors of the treatment. The patient was started on insulin on August 24, 1956, and achieved her first satisfactory coma on her tenth treatment day with a dosage of 120 units. During the first 20 treatments the physiologic response to insulin was erratic and very poor. She missed four treatment days because of secondary reactions and emergence of special symptoms. She gained one hour and 45 minutes of coma time during the period. During this time she was seen in individual psychotherapy, and these hours were directed toward an examination of what role insulin therapy could play in her case. The attitude of the patient changed rather rapidly. She gave up her intense requests for sedatives and no longer needed any type in order to sleep. The numerous somatic complaints disappeared. She stopped attempting to explain why the treatment was dangerous for her and began concentrating a rather intense curiosity upon her reactions while under the drug. She received an additional 49 treatments and gained a total of 41 additional hours of coma during this period. This represents a rather marked contrast to the first 20 treatments. Treatment was broken off on November 20, 1956, and the patient was placed on extended visit on December 6, 1956. At this time she was free of her admitting complaints. She remains away from the hospital and

free of symptoms at this date. The psychologic and physiologic response again fell into two phases: the first one of poor response, the second of good response. The second phase followed upon an observable change in the patient's attitude toward the therapy.

Comment. In addition to an over-all picture of resistance or acceptance of treatment one finds changing patterns of resistance in the day-to-day treatment picture. Patients will exhibit peaks of physical resistance to coma which follow changes in the psychological patterns. This seems especially evident in paranoid schizophrenics with well-elaborated delusional systems. This type of patient is frequently found on the Insulin Unit. When patients who possess well-structured, relatively fixed delusional systems find these systems becoming more loose and more vague to them, they show increased anxiety about the treatment. They often develop the idea that the coma is a "brain-washing" technique whose purpose it is to rob them of one of the most important things in their life—their delusional system. The subsequent course may then become stormy indeed, with a profile of greatly increased physical insulin resistance; or, if the patient feels resistance is useless, it may become an apathetic course with little or no resultant improvement in the mental status as in the following case.

Patient #6. Paranoid schizophrenic, age 43, female, first admission 1953, second admission 1956. Symptoms were marked by a complicated, rigid, grandiose delusional system centering in the religious sphere. Patient was extremely neat and tidy, placing great emphasis upon manners and politeness. In the hospital she was cooperative, pleasant, and able to operate at times without interference from her delusional system.

Patient placed on Insulin Unit in March, 1956, and started on insulin therapy on March 20, 1956. The patient had formerly been a registered nurse. She was vociferous in her objections to insulin coma therapy, stating that she could not stand the treatment physically and that good doctors never gave dangerous treatments to their patients. In both group and individual psychotherapy she spent a large amount of her time stating reasons invalidating this type of treatment. All of her objections were based in a physical sphere. She continued to maintain the integrity of her delusional system and her utter belief in it. During the first 20 treatments she consistently simulated late reactions in an effort to avoid the next day's treatment. In this she was successful only once. During this treatment period she received dosages up to 270 to 300 units of insulin without going into deep coma on any treatment day.

On April 22, 1956, she returned to her home for an overnight visit. She threatened before leaving on this visit that she would do everything in her power to remain away from the insulin unit and its treatments. While at home she embarked on a very ambitious project to accomplish this. She visited her family doctor, then the local health officer, then an attorney, and finally the emergency room of a large urban hospital nearby. These all represented efforts to get herself under the care of someone other than the hospital physicians. She failed in all these efforts. She then barricaded herself in her room and defied her husband to take her back to the hospital. The husband called the hospital, and attendants were sent out to bring her back to the hospital. The patient returned very quietly with them, and no further incidents occurred.

Following this rather traumatic weekend at home, with the attendant thwarting of the patient's every effort to escape physically from insulin therapy, the patient showed a remarkable change of attitude. She began going into deep comas fairly regularly, getting an average of 20 minutes of deep coma at every treatment. She complained as much as ever about the therapy and the harm that it might do her, but her complaints no longer centered in the strictly physical area. She repeated more and more often that the treatments were destroying her memory so that she could not recall all the details of her delusional system. As treatment progressed she began to suspect that she was being brainwashed in an effort to convert her from the Catholic church and from her mission in life. She recalled that patients in a stage 2 coma were quite wild and talked incoherently, and she felt that when she did this, the information gained from her was in some manner used to further the brainwashing. As this idea was developed, her physical reactions in therapy underwent change also. At this stage she had accepted the idea that she would have to undergo the treatment whether or not she felt it was wise. But she had also developed a deep-seated fear that the treatments would damage or eliminate her delusional system. She now presented the picture of a patient going regularly into deep comas but under some rigid all-pervasive type of control. From the moment the shot was administered until termination of the coma, she lay quietly on her back with her arms at her sides, eyes closed, breathing deeply and regularly, and making no gestures nor uttering any sound. Although stages of insulin coma are generally felt to be a stripping away of successively older strata of the brain, cerebral to subcortical to midbrain to medulla, accompanied, of course, by loss of voluntary phenomena, this patient in some way seemed to follow this process with a rigid, controlling part of herself which even the elimination of the newer centers could not eliminate. It was as though this control which was her only remaining defense for her delusions was all-pervasive, reaching from the outermost layers of the cerebral cortex to the medulla itself. The stain of schizophrenia seemed to have penetrated every cell of the central nervous system. During the last 40 treatments this remarkable control continued without letup. At the same time in these 40 treatments her physiological resistance to insulin remained at a lower level than before. The patient completed 60 treatments with a total deep coma time of 17 hours, all of these hours being gained in the last 40 treatments.

Comment. This patient was a group I patient subsequently transferred to another building where she remains today. Her treatment was marked by two phases. The first was a rather intense physical resistance to coma, the second a rigid sort of acceptance of coma. But throughout she displayed a psychologic resistance of a high order, and her symptoms remained relatively untouched at the end of treatment. Her case, however, illustrates a point. The therapist must be alert throughout to changes in mental sets. Patients who enter the unit with an accepting mental set may become resistive at the point when the delusions begin to clear, and at this time they need even more psychotherapeutic support than previously if treatments are to progress as smoothly as before.

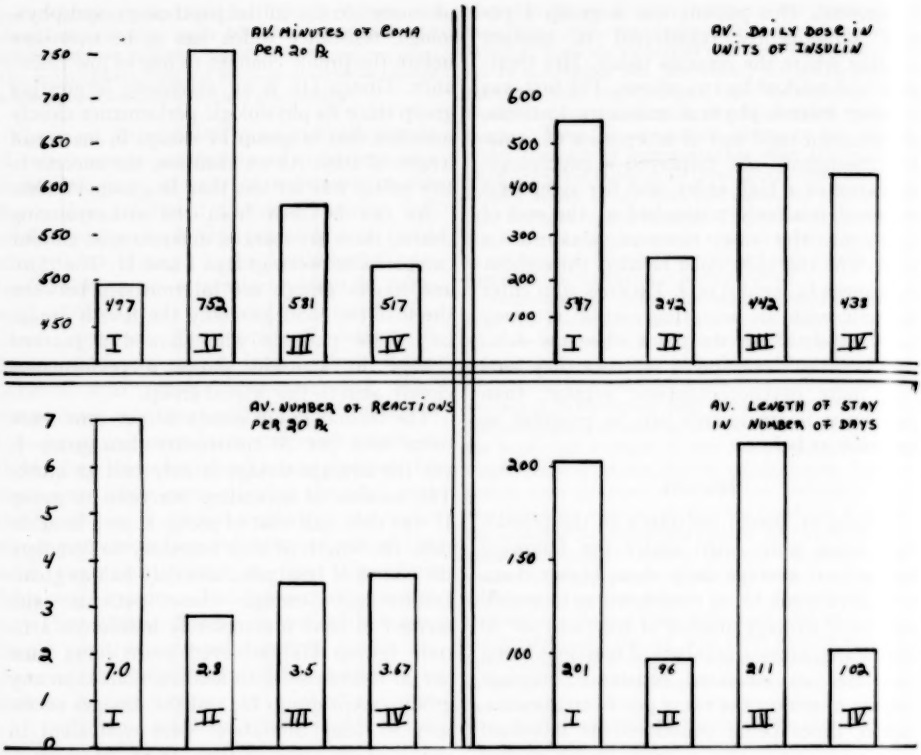
Results

Criteria of insulin resistance in the physiologic sense were rated under the following four points: average daily dose, higher doses to achieve coma being considered as increased resistance; average number of reactions per 20 treatments, greater numbers of reactions being considered as increased resistance; average number of minutes of coma per 20 treatments, shorter times being considered as increased resistance; and finally, average length of stay in number of days, the longer stays being considered as increased insulin resistance. Thus we see that the profile of a patient with high insulin resistance physiologically would be a high daily dose achieving a small amount of deep coma time accompanied by many reactions and necessitating a long stay on the insulin unit. The converse, a patient with low physiological resistance to insulin, would be one with a profile of low doses of insulin producing lengthy coma times but accompanied by few insulin reactions and necessitating a short stay on the Insulin Unit.

The two groups contrasting most strongly psychologically, i.e., group I versus group II, show the greatest contrast physically also. Group I, psychologically resistant, follows the profile of great physiologic resistance, while group II, the psychologic acceptors, reveals a profile of low physical resistance to insulin. Group IV follows fairly closely the pattern of group II, but performance is not as good due, of course, to the initial psychologic and physiologic resistance which has to be overcome before the profile changes to one of low resistance. Group III is an extremely interesting group since its physiologic performance closely matches that of group IV except in matter of length of stay. As we shall see, the success in this group was far less than in group IV also.

As can be seen from the accompanying charts, there are marked differences in all four categories between groups I and II. The third and fourth groups are intermediate between the first two, and generally the fourth group, i.e., those patients who showed a marked change in attitude shows a performance closely akin to the second group.

The second group shows 50 per cent more coma time per 20 treatments than group I, yet the average dosage is only half as much. The number of secondary reactions in group II was only half that of group I; and, in addition, the length of stay necessary to complete the course of treatment was only half as great. Interestingly enough those patients who seemed to have a completely indifferent attitude (group III) achieved more coma time per 20 treatments with less reactions than any group except group II; and the dosages necessary to bring this about were equivalent to the dosages used in the group showing a change of attitude (group IV). However, when one looks at the length of time these patients were in treatment, he sees at once that their stay on the unit was the longest of all. And indeed, these patients usually require the maximum number of hours of coma (60). Moreover, these patients often appear unchanged by their course of therapy. Their bland indifference extends deeper by far than a mere passivity to external surroundings. As has been stated already, they perform fairly smoothly, have few reactions and little difficulty in coma. Their excitement phase is less marked, and they respond to termination procedures rapidly. Yet at the end of each succeeding treatment they appear as before, and at the end of a maximum treatment period they are as they were when admitted and must be transferred elsewhere within the hospital. The patient is willing to react in an accepted physical fashion to the treatment but unwilling to change in any demonstrable



way. The fourth group, also an intermediate group as far as reactions, dosages, and coma time are concerned, showed an average length of stay only slightly longer than that of patients who arrived on the unit with the idea that the treatment was helpful. As a matter of fact, if one examines criteria of performance in these patients following their change in attitude, it can be seen that these are comparable or even better than group II. This could possibly be due to increased efforts used to get them to accept treatment so that finally they come to have even firmer convictions that this is the best for them than do patients of group II.

In table 1 can be seen the outcome of therapy in the various groupings. A success in therapy is rated as a remission or improvement to the degree that the staff was able to discharge the patient to his home and the patient has been able to maintain himself outside the hospital since that time. Patients who were considered for discharge but were turned down and subsequently transferred to another building were considered as therapeutic failures. Naturally some of the failures actually had improvement to some extent. However, these patients were selected for a full course of deep insulin coma and were treated with the idea of maximum improvement or a full remission in mind. Thus they can be rated as something less than a therapeutic success. These patients are not matched as to severity or chronicity of their illness but are merely classed in the four standard groupings listed above. However, some of the patients in group II had shown symptoms and had had psychiatric treatment for as much as four years prior to coming on the Insulin Unit, and some of the patients in group I had shown illness for only a few weeks before arriving on the Unit. As can be seen the greatest percentage of success occurred in group II, followed rather closely by group IV. Group III was third in

TABLE 1

	Remaining in Hospital	Discharged	Total
I	85.8% (6)	14.2% (1)	100.0% (7)
II	0% (0)	100.0% (5)	100.0% (5)
III	66.7% (4)	33.3% (2)	100.0% (6)
IV	11.1% (1)	88.9% (8)	100.0% (9)
Totals...	40.7% (11)	59.3% (16)	100.0% (27)

successes but was separated rather widely from groups II and IV, and group I was last with a success percentage of only 14.2 per cent.

Group I had 14 per cent considered treatment successes, while group II had 100 per cent treatment successes. Group IV again closely parallelled group II with 79 per cent success in treatment, and group III gave 33.3 per cent success. Here too, group III shows interesting results. They have as it were a fluid line of defense which gives each day in the face of the therapy but is never broken through because it is so elastic. Those definitely against therapy cannot afford to respond physiologically and so need high doses and have frequent reactions. Those who change their attitude no longer need somatic resistance, and the performance becomes smoother.

Correlations. There appears to be a definite correlation between the "mental set" of the patient and the physical resistance which he has to insulin. The level of insulin resistance can be influenced to a degree by the psychologic resistance to the idea of treatment. The mechanisms through which this occurs are still obscure. One could postulate a path by which discharges from the cerebral cortex are mediated in the limbic lobe hypothalamus to produce release of adrenaline selectively (5, 14, 15). And adrenaline is a known physiologic antagonist of insulin (3).

Prognosis. From the results obtained in the study it would seem that patients who are admitted on an insulin unit feeling that it is a preferential type of treatment for them carry a very good prognosis for improvement in therapy and also a good prognosis for undergoing therapy with the least trouble and danger. Those who are against the treatment or feel it is a gesture of hopelessness or futility carry a poor prognosis for improvement and also are far more likely to have a difficult time during treatments unless they also have adjunctive psychotherapy aimed at giving them confidence in the insulin treatment and are enabled to adopt a more hopeful outlook. If they can do this, the prognosis soon can be changed to a far more favorable one. In addition it seems likely that patients who have no attitude at all are by far the worst type to treat. Although they do well somatically speaking, they do nothing at all as far as their illness is concerned.

Factors involved in psychic resistance. Investigation of a resistive subject often shows him to have developed his mental non-acceptance of insulin treatment by an accumulation of feelings and impressions gained prior to coming to the insulin unit. These patients appear to be carrying feelings of rejection inculcated in them by the doctor who counsels insulin therapy as a desparation measure. When therapy is presented to a patient, responsibility for the future course of his illness is shared by the therapist. But when we offer him a treatment in the manner of washing our hands of the case, we then reject our part of the responsibility, and in doing so we reject the patient.

An aura of confidence must be maintained if the patient is to gain any benefit from the treatment. This feeling must be communicated from the first contact. If the physiologic response is poor, the psychologic response will also be poor, and if confidence in the treatment is lacking, the physiologic response will generally be poor. Should the doctor doubt the possible benefits of a type of treatment, he should avoid presenting the treatment to the patient. Above all, he should not present it as a last hope—a sort of straw for a drowning man to clutch at.

The patient's own interpretation of the physical treatment and its significance may be of great importance in the outcome of that treatment. The ill-prepared patient may also show high levels of physical resistance. The transfer to insulin may be accepted as a valid next step in his treatment, but may be interpreted by him as punishment for an imagined fault. This seems to be the case with patients whose ward physicians do not fully explain

what the treatment is like. The patient resists insulin and everything about it, including the therapist, because he fears an unknown and unimaginable experience.

Finally, the patient may have arrived at a point of skepticism regarding any active therapy because he has been through many types of previous therapy in a rather random fashion. To him the present scheme of therapy is another stop in what has become a rather boring round of treatments.

Functions of psychotherapy. In spite of statements to the contrary, psychotherapy is a necessary corollary to the insulin therapy. As various methods of dosage are used to reduce or overcome physical resistance, just so is psychotherapy employed to overcome psychologic resistance. There are three critical times where psychotherapy is most important. The first of these is with the patient on his own admission ward. Here, the patient should have some preparation for the coming therapy by his own ward doctor with whom the patient is familiar. The treatment should be explained to the patient, and the decision to use it should be presented in a fashion which implies some command of the situation by the doctor. This is to be a means by which the patient will prevail over the symptoms of his illness. The patient is more apt to respond to his own doctor than to some stranger from an insulin unit.

The second critical time for psychotherapy is upon arrival in the unit. In these first days the amount of acceptance or resistance should be determined and attempts made to overcome it.

The third critical stage is at the point where the delusional system, hallucinations, or other symptoms begin to fade. A sharp increase in psychic resistance can be expected at this point where the defenses a patient has erected at great cost to himself begin to lose their subjective reality. He must have help to build something new in their place. He must, if possible, be kept away from ideas of brainwashing. He must be helped to accept this loss of symptom as a natural thing. If therapy is unsuccessful at this point, the usefulness of the insulin coma may be destroyed.

In addition it seems necessary to have continuing psychotherapy during the course of insulin treatment if the patient is to continue at a low level of resistance.

Aims of psychotherapy. The immediate goals of psychotherapy directed toward successful administration of somatic therapy seem to be fourfold. First is removal of the attitude of hopelessness or impotence in the face of the illness. Secondly is an inculcation of a spirit of confidence in the treatment. Third is the educating of the patient in the methods and aims of the proposed treatment, and the last is support when the patient becomes fearful of physical or psychologic complications arising during treatment.

Although one would like to feel that the physician in charge knows best and that he will help the patient in spite of the patient, the fact remains that the doctor and the patient will overcome the illness together or probably not at all. And this cooperation can be elicited only when both are using a therapy as a weapon which will gain them the upper hand over the illness confronting them. Workers in fields of somatic therapy other than insulin have indicated this also. It has been said before and should be repeated that treatment of any type must be used with a clear idea of the issues and goals involved, else the treatment is of no use or may even be detrimental (1).

Summary

Twenty-seven patients were studied throughout their course of insulin coma treatment to determine if their mental sets correlated with their daily performance in coma and with their eventual disposition.

The physical resistance to insulin was gauged by the amount of insulin in a daily dose, the amount of coma time per 20 treatments, the number of reactions per treatment, and the length of stay on the unit.

Those patients who accepted the treatment as valid showed low physical resistance in contrast to the high resistance of the psychologic resistors.

The psychologically accepting group generally had greater improvement than the resistant group.

One of the major factors in this resistance appears to have been the way in which insulin

therapy was presented to the patient as a proposed treatment.

The results indicate a need for psychotherapy in conjunction with insulin coma therapy. It seems plausible that these observations apply to other somatic types of psychiatric treatment as well.

BIBLIOGRAPHY

1. Alexander, L., and Rosen, I. M.: Management of psychological issues in conjunction with physical treatments. *Dis. Nerv. System, 16:* 232, 1955.
2. Ax, A.: Physiologic differentiation between fear and anger in humans. *Psychosom. Med., 15:* 433, 1953.
3. Best, C. H., and Taylor, N. B.: *The Physiological Basis of Medical Practice*, 5th Ed. Baltimore: The Williams & Wilkins Co., pp. 676–677.
4. Flescher, J.: Further contributions to the psychodynamics of convulsive therapy. *J. Nerv. & Ment. Dis., 109:* 550–554, 1949.
5. Folkow, B., and Von Euler, U. S.: Selective activation of noradrenaline and adrenaline from the suprarenal gland of the cat by hypothalamic stimulation. *Circ. Research, 2:* 191–195, 1954.
6. Freedman, A.: Observations on the treatment situation in carbon dioxide therapy. *J. Nerv. & Ment. Dis., 121:* 359, 1955.
7. Funkensten, D. H.: The physiology of fear and anger. *Scient. Am., 192:* 74, 1955.
8. Funkenstein, D. H., King, S. H., and Drollete, M.: The direction of anger in a lab stress-inducing situation. *Psychosom. Med., 16:* 404, 1954.
9. Gershman, H.: Psychological factors in shock therapy. *Psychiatric Quart., 24:* 300–308, 1950.
10. Hayward, M. L.: Emotional reactions of a schizophrenic to shock. *Psychiatric Quart., 25:* 288–293, 1951.
11. Millet, J. A. P., and Mosse, E. P.: Psychological aspects of electrochock therapy. *Psychosom. Med., 6:* 226–236, 1944.
12. Peterson, A. L.: Experience with carbon dioxide therapy in psychiatric outpatients. *Arch. Neurol. & Psychiat., 67:* 699, 1952.
13. Sakel, Manfred: The classical Sakel shock treatment. A reappraisal. *J. Clin. & Exper. Psychopathol.* and *Quart. Rev. Psychiat. & Neurol., 15:* 1954.
14. Von Euler, U. S.: Noradrenaline in hypotensive states and shock. *Lancet,* July 23, 1955.
15. Von Euler, U. S.: *Noradrenaline.* Springfield, Ill.: C. C. Thomas, 1956.
16. Weaver, O. M., Peterson, D. B., and Anderson, W. H.: Carbon dioxide therapy of psychoneurosis. *Dis. Nerv. System, 12:* 355, 1951.
17. Whitthower, E. D., and Cleghorn, R. A.: *Recent Developments in Psychosomatic Medicine.* Philadelphia: J. B. Lippincott Co., 1954.

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SPATIAL DIFFERENTIATION IN CHRONIC SCHIZOPHRENIA

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A large percentage of those patients who have an acute psychotic episode and fail to improve decidedly within a few months are placed in state or veterans' hospitals for further care. Often these patients remain in such hospitals for years, sometimes for decades. Their illnesses which began with agitation, tension, appeals for help are often marked in subsequent years by a lack of communicativeness, inertia, resignation, and by a decided resistance to any effort directed toward altering their status. Such terms as "burned out" (a burned out human being?), "deteriorated", and "regressed" often refer specifically to this lack of participation by chronic schizophrenic patients in any of the activities of their environment. These patients live for years in hospital wards, having no contact with former friends, neither seeking nor allowing human companionship, and resisting all efforts to alter their way of life.

It has been hypothesized that chronic schizophrenia can best be described as a pathological way of life in which there is a denial of the imminence of personal needs. Importantly, this is a way of life which the patient experiences that has to be maintained at all costs (1). Schizophrenic patients maintain this retreat from society's world in two ways: first, by failing to initiate (volitionally) any movement with regard to their environment, and, secondly, a corollary of the first, when such patients find themselves in activity with regard to society's world, they maintain that the responsibility for their movement rests not with them but with the society. In this way, if they are involved in the world, they discover that the causal factor is outside themselves. Such patients experience that when movement occurs in them, they are pushed. This is demonstrated clinically in a variety of ways.

A patient, 15 years in the hospital, spent most of his time examining his hands, posturing, and seeming to be in a constant quandry about decision making. This patient was observed for a 3-hour period interacting with a doorknob. Whether he was going to open this door or not seemed to be the problem, and he was observed in a grotesque dilemma, touching the doorknob, pulling his hand away, leaning toward the door, retiring from it. After a knock on the other side of the door, the patient instantly opened the door. Another patient violently complained that x-rays were being "shot into my teeth". Examination revealed an exquisitely painful alveolar abscess. Treatment was carried out, and the patient still maintained that he was the victim of something outside of himself. He objected to what was being done to him as if the pain he had observed could not have occurred fortuitously. Another patient who had gone on a hunger strike had to be tube fed. During the process, he would briefly resist, then seemingly acquiesce and allow the tube to be passed. After one week, his physician noted that the patient resisted only when the right nostril was used, and when the tube was placed in the left nostril, the patient made no move to resist. When the physician asked if the right nostril was sore, the patient said that it was, and when asked why he had not spoken before, the patient replied, "You just asked me."

On wards where matches are carried by ward personnel, we have observed chronic schizophrenic patients standing at the nurse's desk, looking in the opposite direction as if unaware of the nurse's presence, with a cigarette unlit in their mouth. When the nurse was instructed to wait to be asked for a match, the patients would often stand for long periods of time, shifting from one foot to the other, seemingly taking no cognizance of her presence, often leaving with an unlit cigarette ten or fifteen minutes later. This behavior might be described as "waiting for a match to appear". As one patient put it, "I'm just sitting by my bed, and food appears. And

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after awhile, it goes away and I'm not hungry." It is as if personal involvement in even the most trivial act is a world-shaking decision for many chronic schizophrenics.

Movement in the space of the world or contemplation of such movement leads to the organization of that space. As individuals concerned with the possibility of movement in space, we think of rightness, leftness, forwardness, behindednesss footness, depthness, upness, and downness, etc. The specific attributions of spatial descriptions are in part assigned by the culture. Thus, in different societies, the specific significance of rightness and leftness may vary. In England, for example, one drives on the left side of the street in obeying man-made rules of the society. In this country, one drives on the right side of the street—and failure to do so will prevent motion. In both this country and England, we read from left to right, turn pages from right to left, but in Israel and China, one reads beginning at the right going left, and turns pages from left to right. In ancient Rome, one read in both directions in alternating sentences. These attributes of the right and left are assigned by the society and, as such, have meaning for those faced with the responsibility of functioning (moving) in the society. If one was not going to move with regard to the society, these attributions of space would disappear, i.e., rightness, leftness, behindedness, etc., would not be a part of their organization.

In a way, one might summarize the above paragraphs by simply saying that the attributions of rightness and leftness are assigned arbitrarily by the society. Arbitrary rules become differentiated for a person only when he becomes involved in the solution to which they have reference. Rightness and leftness will become differentiated for a person who is organized in such a way as to move out in the world.

This problem was studied by a test devised by the late Ira McKinnis[3] and Miller in a study measuring the ability of patients to perceive and conceptualize musical patterns. In a pilot study, it was discovered that there was a peculiar kind of error made by schizophrenic patients with regard to those items whose correctness required adherence to the commonly accepted left-right directionality. In our culture the traditional manner of perceiving symbolical stimuli is in a left to right direction. This is a social norm for western civilization.

[3] Prior to his death in 1954, Ira McKinnis was chief of Musical Therapy Division, Winter V.A. Hospital, Topeka, Kansas.

Hypotheses

In a testing situation where correctness is assigned in terms of this social norm, schizophrenic patients are more likely to make errors than are non-schizophrenic patients.

A corollary to the above proposition is that where adherence to the social norm is not as clearly involved, schizophrenic patients will make about as many errors as will non-schizophrenic patients.

The Subjects

In the study, two groups of 17 patients each were tested. One group was made up of chronic schizophrenic patients. They were between the ages of 26 and 43. All but one had begun high school, and none had gone beyond the fourth year of college. All the patients were on closed psychiatric wards and had been in the hospital on closed wards in excess of two years. All were veterans of the Second World War. These patients as a group were the most "regressed" of the patients in the hospital whom we were able to induce to take the test. The patients were selected by one of us (M. M.), and specifically excluded with two exceptions were patients in the so-called "unregressed" paranoid schizophrenic group. Also excluded as nearly as possible were patients who were regarded as "character disorders" with some schizophrenic features. Patients who had recently completed electro or insulin convulsive treatments as well as patients who appeared to be achieving remissions from their illness were likewise excluded. Among the patients who were tested were several whose clothing was urine stained at the time of the examination. The clinical behavior of patients in this group, their extraneous comments both before, during and after examination were with few exceptions clearly psychotic in variety. Some difficulty was experienced in obtaining subjects in this group. Approximately eighty patients from 10 closed wards were

asked to participate. Of these, 25 agreed to take tests and of the 25, 17 actually started and completed the tests. Of the 25 who agreed to take the tests, eight of the subjects failed to cooperate. They either did not begin the tests or avoided taking it by such devices as selecting a card before the music was played, suddenly behaving in a drunken-like manner, remaining immobile with regard to the selection of a card. The group tested, then, was not a random sample of closed ward, chronic schizophrenic patients. Those tested had agreed to testing. Nevertheless, we were unable to predict in advance which patients would cooperate with us in taking the test and which would not. Several of the patients who took the tests had been quite uncooperative on the ward or were regarded as "uncontactable", whereas others who firmly refused in one manner to cooperate with us were relatively helpful to the ward aides and nurses. All were quite ill, and eight months after initial testing, 16 of 17 remained hospitalized. The control group was composed of 17 hospitalized, open-ward, non-psychotic, male patients between the ages of 21 and 43. All had completed high school, and none had completed more than the fourth year of college. Unlike the schizophrenic group, none of the patients in the non-psychotic control group who were asked to participate refused. In preliminary experiments, it was found that persons with less than a first year of high school education were often unable to understand the instructions for the test.

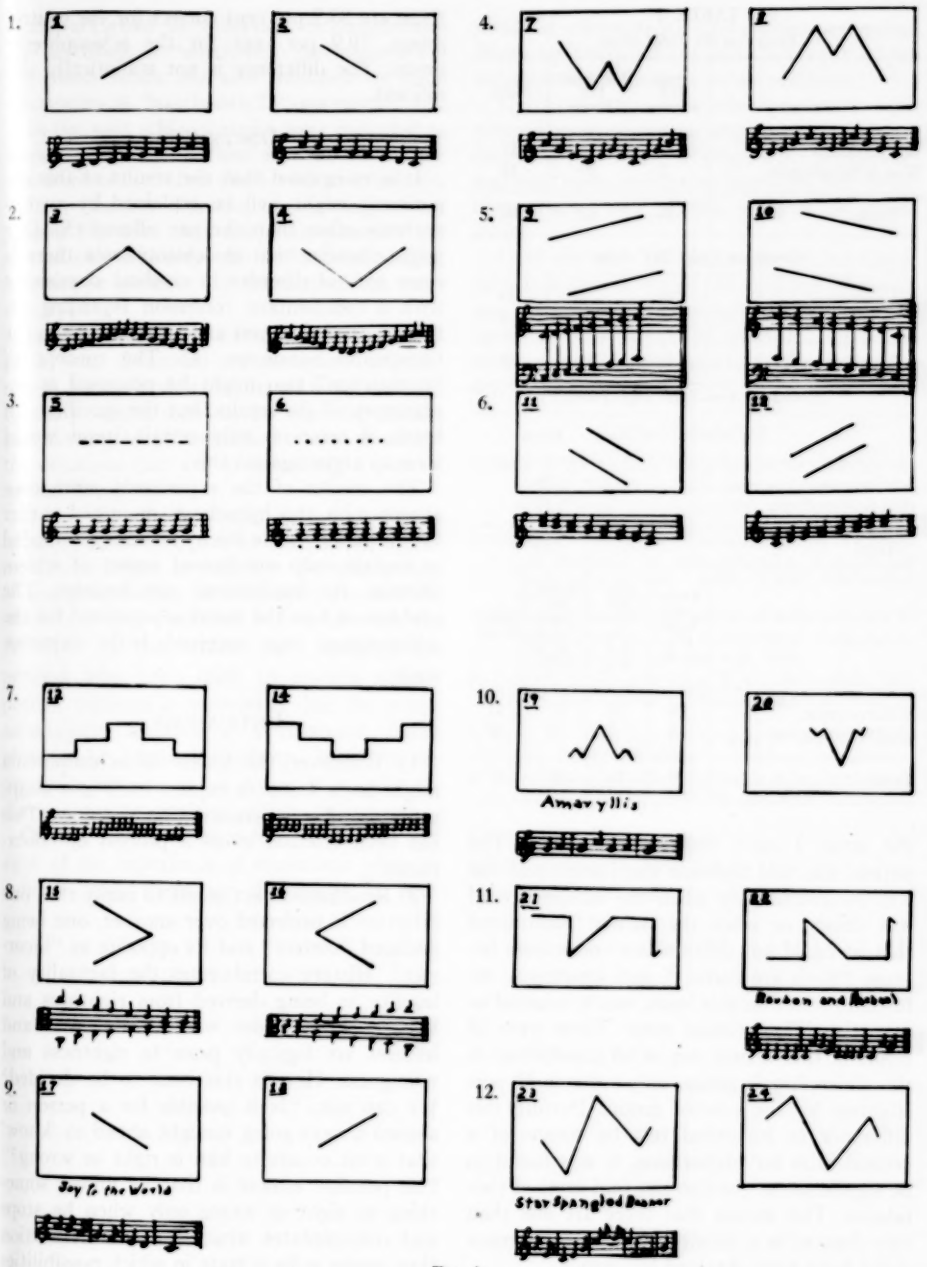
Procedure

The subjects were approached either on the ward or in the nurses' office outside of the ward. They were told, "Mr. X, your doctor has given me permission to ask your help in a study I am conducting. It will take about fifteen minutes of your time. Your helping us with this study has nothing to do with your staying in or leaving the hospital. It has to do only with helping us to better understand some things about patients." If the patient asked for more information, he was told more of the details of the examination. If the subject did not voice a specific objection, we went immediately to the testing room, and the tests were begun. We dealt with the "psychotic" comments and behavior by calling the patient's attention to the test.

The subject who had agreed to take the test was taken to a room in which there was a piano. One person sat at the piano and another sat with the patient, their backs to the person playing the piano. The subject was told, "Mr. X, they are going to play some music on the piano. One of the two cards which I will show you is correct in that it goes with the music. One is incorrect in that it does not go with the music. One is right; one is wrong. You are to tell me which card is right. You are to tell me which card goes with the music." The music was then played and the patient asked to select the correct card. If, after the playing of the first melody (a descending scale), the patient stated that he did not understand, the instructions were repeated, and he was told to "Listen very carefully" while the music was played the second time. The music was replayed on any of the test items whenever the patient made the request. There were twelve pairs of cards. Patients were not told whether their answers were correct. On the first and usually the second pair, and on the fifth and sixth and ninth pairs, patients were asked specifically, "Why did you select this card?" The same question was asked more or less randomly throughout the remainder of the experiment (fig. 1).

Results

On pair groups one, five, six and nine a rather characteristic kind of error was made (table 1). This error will be referred to subsequently as an error of "spatial differentiation". On these items, the simple ascending or descending line (beginning at the left side of the page where the card is numbered) is used to represent an ascending or descending scale. On 26 occasions, 24 times in the schizophrenic group and two times in the control group, the subject correctly stated that the music was ascending or descending (going up or going down as the case may have been), then selected the incorrect card which was justified by beginning at the right side of the page. On several items. the subject objected that both cards were correct. These items were responded to by such comments as, "Well, they are both alike, either one is correct", or "They're both


1.
2.
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11.
12.
Amaryllis
Joy to the World
Star Spangled Banner

FIG. 1

TABLE 1

Errors on the Total Items

	Spat. Diff. Errors	Non-Spat. Diff. Errors	Total
Schizophrenic	24	33	57
Non-Schizophrenic	2	29	31
Total	26	62	88

Errors on Spat. Diff. Items

Schizophrenic	24	5	29
Non-Schizophrenic	2	7	9
Total	26	12	38

Errors on Non-Spat. Diff. Items

	Errors
Schizophrenic	28
Non-Schizophrenic	22
Total	50

	Errors on Items 1, 5, 6, 9	Spat. Diff. Errors on 1, 5, 6, 9	Errors on Items 2, 3, 4, 7, 8, 10, 11, 12	Total Errors
Schizophrenic	29	24	28	57
Non-Schizophrenic	9	2	22	31
Total	37	26	50	

the same, I can't choose from them." The patient was told that one was correct and one was incorrect. Only when the incorrect card was chosen or when the patient maintained that he could not differentiate correctness because "Both are correct" and steadfastly refused to select on this basis, was it counted as a spatial differentiation error. There were 24 errors of this variety out of 68 possibilities in the schizophrenic group, only twice in 68 possibilities by the control group. Putting this difference to statistical test by means of a critical ratio for proportions, it was found to be significant at the two per cent level of confidence. This means that there are less than two chances in a hundred that this difference could have been obtained by chance.

On the non-spatial differentiation items, schizophrenic patients made 28 errors on 136 items. Non-schizophrenic patients made 22 errors on the 136 items. Stated as percentages these are 83.9 per cent correct for the control group, 79.9 per cent for the schizophrenic group. The difference is not statistically significant.

Discussion

It is recognized that the results of this experiment might well be explained by an hypothesis other than the one offered (5). One might theorize that in schizophrenia there is some sort of disorder in cerebral dominance with a concomitant confusion regarding attributions of rightness and leftness such as the Gerstmann Syndrome (4). The concept of "negativism" also might be proposed as explanatory of the results, but the specificity of kinds of error on only certain items would seem to argue against this.

The results of the experiment seem consistent with the hypothesis described earlier in this paper. While the hypothesis is intended to explain only one limited aspect of schizophrenia, its implications are broader. The problem of how the world is organized for the schizophrenic has received little objective study.

Implications

1) Whatever the illness of schizophrenia might be, it seems to express itself in a disappearance of social constitution of things. This has been referred to as a process of "decathexis".

2) Readiness to act seems to imply that one direction is preferred over another, one being declared "correct" and its opposite as "incorrect". History corroborates the factuality of legality as being derived from rightness and leftness. We wonder whether rightness and leftness are logically prior to rightness and wrongness. How is this issue to be decided? We can ask, "Is it possible for a person or animal always going straight ahead to 'know' that what occurs to him is right or wrong?" One possible answer is that he knows something as right or wrong only when he stops and contemplates what is ahead. Reflection then seems to be a state in which possibilities of action occur to one, and a prototypic reflective situation is one in which one perceives the possibility of moving either to the left or to the right. We do not believe schizophrenia

is characterized by reflection. Schizophrenics are described as "sensitive," "introspective"; but these labels are also modified by such statements as "narcissistic", "egocentric", etc.

In the past schizophrenics were regarded as belonging to the lawless element of society and were in fact often dealt with as criminals. Today, Talcott Parsons, a sociologist, expresses the idea that our schizophrenics are the radicals of society who are institutionalized in order to preserve the stability of the community.

Jules Masserman in a fascinating paper suggests that delusions are necessary requirements for normal living in society, and the corollary would seem to be that the schizophrenic may be an individual unable to accept the delusions that are so intimately a part of normal living (6).

If the way of life of schizophrenic patients is truly bounded in part by the issue of movement, one might investigate the relationship of symptomatology of schizophrenia and its relation to this problem. It has been an observation of the authors and many other persons who have tried to involve schizophrenic patients in movement that the symptomatology, whether of a catatonic, hebephrenic, or paranoid variety, often either precludes movement or makes it mandatory that volition be extrinsic prior to movement.

Certain recent experimental studies on the issue of the experience of movement seem to indicate that there are differences in hospitalized schizophrenic and normal perception. Work by Diamond (3) and Carini (2) on the autokinetic phenomena seems pertinent.

3) Those who work therapeutically with schizophrenic patients empirically use evidences of movement as diagnostic, prognostic, and treatment evaluating measures, but definitive studies and criteria need to be established.

4) If the way of life of the schizophrenic patient is one in which the problem of movement is so crucial, one might contemplate the nature of the psychosis precipitating issues which seem to be resolved by this pathological way of life.

BIBLIOGRAPHY

1. Betz, B. J.: A study of the tactics for resolving the autistic barrier in the psychotherapy of the schizophrenic personality. *Am. J. Psychiat., 104:* 267–273, 1947.
2. Carini, L.: An experimental investigation of perceptive behavior in schizophrenics. Unpublished Ph.D. dissertatino, 1955, Clark University, Worcester, Mass.
3. Diamond, D. M.: The ability of schizophrenics to modify response in an interpersonal situation. *J. Consult. Psychol., 20:* 441–444, 1956.
4. Grinker, R. R., and Bucy, P. C.: Springfield, Ill.: *Neurology,* Charles C. Thomas, 4th Ed., 1951, p. 387.
5. Levin, M.: The capacity to split. *J. Nerv. & Ment Dis., 119:* 61–66, 1954.
6. Masserman, J.: Faith and delusion in psychotherapy. *Am. J. Psychiat., 110:* 324–333, 1953.

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SOME POSSIBLE MEANINGS OF THE HALLWAY INTERVIEW[1]

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The "hallway" in the ward or division of a psychiatric hospital has many meanings and uses. It may be said to represent an island, on which the patients can pace up and down, faint, line up to wait for meals, linen, cigarettes and other material needs, socialize with other patients and personnel and meet their visitors tearfully, impatiently, angrily or joyfully. Patients leave the island to enter the therapist's office, to reenter their rooms and to return to their homes for weekend visits or possible discharge. On the surface of this island, patients will stop their own therapist as well as other staff members to ask questions, make remarks and request things, which may appear to be without significance. It may be true that many of these hallway contacts are innocent and without a deeper meaning. However, the psychiatric patient's illness is, in part, a problem in communication, which suggests that any attempt at communication, verbal or otherwise, in any area, may be of significance.

Why should the patient pose a "hallway interview" in the first place? What good, if any, does the therapist accomplish by interviewing a psychiatric patient in the hallway environment? Would it be worthwhile, in an in-patient setting, to take the patient into the privacy of the therapist's office after receipt of a hallway interrogation, request or statement to see if anything else of deeper significance was being relayed? It would seem that focusing upon the patient in such a way, listening to him and trying to understand him would be enough make him feel worthwhile, a goal to be reached with many problems of interpersonal relationships (2, 5).

Before the hallway encounter was brought to our attention as a possible significant contact or maneuver by the in-patient, the verbal productions *seemed* innocent enough: "Doctor, may I have a laxative? Will you have time to see me today? May I have a phone call? You said I could have a phone order yesterday and I didn't get one. May I have one today? What time can I see you? Can I get anything for my feet (or headache, toothache, cold, constipation, diarrhea, menstrual cramps or back)?"

It was proposed that rather than answer some of these requests and questions in the hallway environment, some of these patients should be invited into the therapist's office for brief interviews. These were to be unscheduled, impromptu and to last from 15 to 40 minutes, in order to see if the patient had other "things" in mind beside the original communication. The more informality and matter-of-factness, it would seem, the better.

As soon as the patient was seated, an encouraging and quizzical look on the therapist's face served more than words to urge the patient to "continue where you left off." The length of the interview depended a great deal on: the type of material elicited, the desire of the patient to terminate the interview, and the mutual feeling that the "hallway" contact terminated satisfactorily in the office interview.

It seemed uncanny that many hallway encounters took place before leaving the unit for staff conferences and seminars, for lunch or home. It was difficult, therefore, to grasp the opportunity to take every patient into a therapy office after a hallway encounter, because of the therapist's schedule. Unless the therapist had the time for unscheduled office interviews, the patients' hallway contacts were minimized, and they were not invited into the office. Also, there existed the possibility that some of the more demanding and manipulating patients on the unit would soon surmise that: "the way to get into his office to see him is to ask him something in the hallway." Of course, if that were to happen, perhaps the purpose of the study would be defeated. It was felt that the patients did not learn that it was a routine matter to bring them into an office.

Interview material was gathered over a 7 month period. The office sessions after hallway contacts were recorded 27 times and were confined to 13 patients. Eleven of these

[1] Read before the 1957 Annual Meeting of the Ohio Psychiatric Association, April 19, 1957, in Columbus, Ohio.

patients were personally treated by this writer on a female unit of Columbus Receiving Hospital. The material used for this study was unscheduled and extemporaneous, as described above. It was decided to confine this special type of office interview for the most part to patients treated by this writer, in order to avoid, as much as possible, any interference with the therapy of his colleagues. He also felt that one must either take at face value a hallway encounter or look for other meanings on the basis of his own intimate opinion of just who and what is *his* patient. He looked for these meanings after evaluating inferences, implications, allusions, tones of voice and the like, in relationship to the total therapy situation, including the hallway meeting (4).

Discussion of Some Hallway-to-Office Examples

Mrs. A., aged 36, was married to an active business man much older than herself. She verbalized many somatic complaints. It was felt from the patient's history and attitudes that she experienced many problems in the sexual sphere, which she did not communicate. A rigid wall of resistance was noted as soon as she set foot inside the unit. This therapist offered her a supportive, non-challenging therapeutic relationship. Hallway contacts were usually infrequent and superficial.

Hallway: "Can I talk to you for a minute, or are you busy?"

Office: "I had a dream, a sex dream last night. Well, you know, it excited me. Oh, it wasn't exactly that I dreamed, but I just woke up excited and felt like I was having intercourse. I never had a dream like that before! What does that mean?"

It did not seem to this therapist that the type of supportive relationship between himself and this woman warranted any interpretive approach (1), and so, at this point, he asked the patient about the health of her husband. She then poured forth that she has not had sexual intercourse with her husband for many years, she has never experienced an orgasm and she feels that her husband is impotent. It may be said that Mrs. A. just did not want to "talk to me", and if the above communication was allowed to be disclosed in the unsuspecting hallway, irreparable damage may have ensued. This patient made no further reference to this sphere of her problems after this interview, as if she wanted to get the above information quickly out of the way once and for all. Thus, she used a hallway contact followed by a brief interview to reveal most intimate and threatening material, which she did not discuss again. She made steady improvement and was soon discharged with a stronger defensive wall around her than before.

Mrs. B. was a poorly endowed, middle-aged and obese female who was rather awed by the milieu of the unit and the "omnipotent presence" of this therapist. She was a dependent, hysterical personality who was exposed to tremendous doses of neglect, coercion and deprivation of love during her early years. It was typical of her behavior on the unit to avoid as many contacts with the personnel as possible. During interview situations, she remained guarded and evasive and her gaze was most often averted.

Hallway: "Can I have a laxative?"

Office: "My people haven't visited me since I've been here. I wish they would get in touch with my husband so's he can bring me things. I don't like to ask my people, no way, to do things for me. (Tearfully and angrily:) My people wouldn't come to see me and my husband should bring me things!"

This patient made no further mention of her request for a laxative throughout the remainder of the interview. Perhaps she could have been granted a laxative in the hallway. However, in the judgment of this writer, such a disposition may have been experienced as further rejection by the patient, and, therefore, her need for communication of her feelings of loneliness and lack of closeness would not have been met until a much later date in her hospitalization. She used the protection of the hallway on many future occasions to let this therapist know that he was not spending enough time with her or to complain about the lack of attention given to her by the unit personnel. Hallway interactions on these occasions were minimized, and scheduled supportive psychotherapeutic measures were intensified. This type of reaction suggests that the requests for medication often symbolize other needs.

Mrs. H. has a rather long history of disturbing interpersonal relationships, passive dependency, ineffective aggression feelings of guilt and resentment, combined with an urge to cause hurt to herself as punishment, as well as to others who try to get too close to her. Her psychiatrist left the unit for a week's vacation. On the second day of his departure, she became abusive and threatened the nurses as well as the patients. Suddenly, she ran into the hallway and loudly demanded that this therapist, who was leaving the unit for a staff conference, give her permission to make a phone call.

Office: "I'm so upset. I just can't take it. What time is it? Can't I call my mother-in-law? I have to call her, I tell you. I have a nervous breakdown." (She began to bite her lower lip and wring her hands.) This therapist remarked that she appeared to be very upset.

"I can't stand it much longer. I'm sick, I tell you!"

It was then suggested to the patient, after she gave full vent to her feelings, that she was greatly disturbed because her therapist was gone. She was reassured that he would return, and that her upset feelings are not unusual. The phone call request, mentioned again in the office, appeared to have a secondary value to the patient's need to express the resentment and anxiety that she felt for being abandoned. This resentment and anxiety were accepted, respected and reflected in the privacy of an office situation. Considerable loss of face might have occurred if this same material was discussed in the hallway.

Mrs. T. described feelings of depersonalization, multiple bizarre somatic complaints, fears of death and harm to herself and her family. Her consuming dependent needs were rejected by her husband in a passive manner.

Hallway: "May I have a telephone call order?"

Office: There was a few minutes of silence after seating. Then, Mrs. T. lit a cigarette and laughingly observed that her hands were sweating and shaking. "This reminds me of the time I was frightened by a cat when I was little. He jumped on my bed, you see, and I thought surely the spooks were after me. I was always afraid of thunderstorms, too, but so was my mother. I never had confidence in myself, you know? I wanted to tell you about my mother-in-law. We just haven't been on friendly terms. She didn't approve of me being southern. She was anti-southern. I felt he was always too attached to his mother. He was a mama's boy." From this subject, the patient went on to her hives, a complaint since admission, telling how they itched like fury, especially when she got out of her bath. She did not understand why this happened.

No further reference was made to her hallway request for a telephone order, once she was seated in the office. It seemed that the patient had the need to tell me in this interview that when she tried to wash off her dislike for her husband and his mother, she breaks out in hives. The patient's hostility and resentment in this area turned out to be crucial factors in her therapy. It is interesting to note that Mrs. T. used the hallway on repeated occasions in order to alert me to her dependent needs. Often, she asked me to give her things, such as, medicants for constipation or menstrual cramps, or various privileges. The reactions of patients which demand hallway interviews are often repetitive. They suggest deep dependency problems which should alert the therapist so that he will try to care for the patient's needs in the next regularly scheduled interview.

Discussion

Some examples of typical hallway meetings and subsequent unscheduled office interviews are given. There are many reasons that can be offered to explain why a patient would want a hallway "package interview." To some patients, the therapist may be less imposing and omnipotent in the hallway than in the office. In the safety of the corridor, they may feel free to dare communicate with him on more equal terms. Certainly, it is a good thing for the psychiatric patient to be able to experience the therapist as other than an omnipotent being, in the protection of their hallway island (3). It would seem to be important that the therapist realize this regard for his role. Then, he can attempt to remedy this ofttimes damaging concept by individual or group psychotherapy, thus doing away with the necessity for the patient to seek the safer hallway to react and communicate with him.

and gain the possible conviction that omnipotence (and thus, magical power) is indeed present and overwhelming.

Cornering the therapist in the hallway may, at times, puts him on the spot, such as, when he is asked for a privilege by one of his patients in front of another who cannot have such a privilege. In the hallway, the doctor may be placed in the uncomfortable position of making a hasty and perhaps injudicious decision before he hurriedly leaves the unit bound for a staff conference or other hospital function. If the patient wants to escape from the closeness and threatening discomfort of therapy in the office, what better way to do so than in the less-constricting confines of the hallway? It can also serve as a convenient way to let it be known that more personal attention and more interpersonal reaction is needed. Usually, this is voiced as: "If you are not too busy, can I speak to you for a minute?" or "I realize that you have to go now, but may I ask you something, please?" Often when the therapist feels that the extent of his transference relationship is a shallow one, he suddenly learns in the hallway, sometimes loudly and to his embarrassment, that his patient deeply resents his weekend off, several days illness or a vacation. Extremely dependent patients can cautiously use the hallway to let their doctors know that his support of them just cannot stop short of office interviews and that they need more of him! Therefore, they will ask him to do things for them, like giving them laxatives, drugs, telephone and other privileges, which really appear to symbolize other needs. Individuals with severe dependency problems, who are unable to handle the "omnipotence" of the therapist and other authority roles, most frequently sought hallway interviews in this study.

There appear to be advantages that are secured when the patient is interviewed in the privacy of the office after the hallway meeting. The original reasons for the hallway encounters are seldom mentioned again, once the patients are seated in the office, thus indicating that something else was on the patient's mind besides *just* a laxative, an aspirin or just "wanting to talk to you." Dynamics that are often undisclosed prior to the hallway meeting may suddenly gush forth. These range from a need to get reassurance as to progress and prognosis for working on their problems, to a desperate plea for understanding and acceptance.

However, it is recognized that adherence to the line of thought that *whatever* a patient says in the hallway setting or in any psychotherapeutic setting has a deep, hidden, significant motivation and meaning may cause a very obvious and practical communication to be overlooked. For example, if a patient stops the therapist in the hallway and asks for a laxative, constipation may very well be present and not necessarily repressed hostility or painful feelings of neglect. Furthermore, the patient may very well be saying: "The closest I want you to get to me is for you to treat my bowel complaints." Such a patient would be very threatened if confronted with the closeness of any interpersonal reaction, such as done in this study, as a result of her warning. This therapist notes with interest that in the past his colleagues as well as himself have fallen into the hallway trap of actually getting involved in a discussion, sometimes rather heatedly, pro and con, about gastrointestinal physiology. As the therapist gets to know his patient's current difficulties in living, there emerges in the transference relationship a complex of patterns, assumptions or distortions which give clues to the origin of the psychiatric illness (6). On the basis of this knowledge, the therapist can decide whether it would be worthwhile, if he has the time, to search for important hidden meanings attributable to the hallway encounter, in the privacy of his office, or take it at face value. When in doubt, or when he is unfamiliar with the patient's reaction pattern, it would seem worthwhile and less damaging to the doctor-patient relationship to minimize "hallway psychotherapy" and treat all contacts in such an area with a laissez-faire attitude. The hallway is rightfully within the realm of the *nurse*-patient relationship, and the therapist would do well to respect the nurse's role in this area. In an active milieu setting, the nurse can be encouraged to perform much good with hallway interaction.

Summary

The unresolved, "omnipotent" distortions of

the doctor-patient relationship and the wish to symbolize other needs in the sphere of severe dependency problems appear to account for some of the reasons why the psychiatric patient poses hallway contacts. It would be worthwhile to invite the patient into an office for a brief interview after receipt of a hallway encounter, if the schedule of the therapist permits. Dynamics and needs that are held back or not fully understood may suddenly be put forth after a hallway-to-office maneuver. Such information can be effectively utilized in future planned therapy sessions.

Hallway contacts are of such significance that unless the therapist thoroughly understands the patient involved, he should minimize interaction in the hallway setting and encourage this important area to be handled by the psychiatric nurse.

There should be little reluctance on the part of the therapist to remove the patient from the hallway to his office, however, when an effort at minimization has failed and the patient continues to be tearful, loud, angry, demanding or threatening in the hallway. The place for individual psychotherapy is rightfully within the private confines of the therapist's office. A power struggle and scene in the hallway between therapist and patient could prove to be anti-psychotherapeutic and therefore quite harmful to the doctor-patient relationship.

DISCUSSION

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Care of the mentally ill is a complex, difficult and demanding task if it is to result in therapeutic benefit for the patient. The patient in his dependent relationship is often confused by the many roles of his therapist. This paper sheds some light on one of the necessary roles that faces a therapist if he has contacts with his patients other than during the therapeutic hours set aside for this purpose. It clearly demonstrates a course of action to be followed in the event patients pose a hallway question, demand or complaint. It strongly suggests the probabilities that patients have ways of trying to utilize the dependent relationship so that their experiences may yield more progress in the hospital, if the therapist is aware that nondirective listening offers the patient the opportunity to reveal and discover more about his feelings and the interpersonal situation. It is apparent from this paper that the patient can move from the hallway with the help of the therapist to a situation where less confusion, competition and privilege-seeking exist. Specifically, the author has shown that dependence, symbolic attitudes and needs, deep intimate feelings and personal problems may be frustrated by maintaining the role of a hallway prescriber who believes he understands the patient on the spot or who bestows upon the patient some kindly gift like aspirin, laxatives or sedatives. The paper indicates that any routine by the physician should be questioned when its omnipotence progressively reduces the patient to impotence.

In experiences which I have had following a similar plan to that outlined by Dr. Brandes, I have noted that it teaches patients very quickly some very important things about themselves. Some generalizations will illustrate the point. Patients who ask for sleeping medicine often end up talking about their dreams, their thoughts before going to sleep and their difficulties in adjusting to hospital policy or other patients in the unit. Except in very refractory or long-standing symptom formation, requests for medications for functional disorders soon are forgotten as patients learn to adapt to more favorable natural routines. The idea that consideration is given to the patient in such a personal way facilitates communication and shows that needs which have formerly been unmet can now be understood and this helps raise the patient's lowered self esteem.

This paper highlights the role of the psychiatrist who by the structure of his hospital organization must move among his patients. It therefore follows that his moves should have a specific purpose. Why visit your patients casually? To make them ask questions we have no time to answer? To elicit complaints that we cannot magically relieve? I think not. To observe their behavior in a setting other than our office? This may be justified when the difficulties of the patient are such that we should move to such activity. However, we should know our obligations, our purposes and above all be ready to give the patients ade-

quate time when such a move is made. If this is not possible because other patients move into the orbit of our interactions, we must respond to them meaningfully and tell them of our intentions towards them with all the respect that the situations call forth.

Many other aspects of this stimulating paper could be discussed. However, although the author has shown that awareness of the implications of the hallway interview is important, stress should be given to its helpful effect for milieu activity, serving to show by example that the therapist expects others: nurses, aides, and all other personnel (social service and O.T.) to maintain and promote therapeutic attitudes.

BIBLIOGRAPHY

1. Pine, I.: The effects of non-interpretation of dreams during psychotherapy. *J. Nerv. & Ment. Dis., 122:* 361–366, 1955.
2. Schwartz, M. S., and Shockley, E. L.: *The Nurse and the Mental Patient.* New York: Russell Sage Foundation, 1956.
3. Silverberg, W. V.: *Childhood Experience and Personal Destiny.* New York: Springer Publishing Co., Inc., 1952.
4. Stanton, A. H., and Schwartz, M. S.: *The Mental Hospital.* New York: Basic Books, Inc., 1954.
5. Sullivan, H. S.: *The Psychiatric Interview.* New York: W. W. Norton & Co., Inc., 1954.
6. Wolstein, B.: Transference as an interpersonal process. *Am. J. Psychotherapy, 8:* 673–674, 1954.

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A RAPID INTERDISCIPLINARY METHOD FOR NEUROPSYCHIATRIC EVALUATION OF FAMILY GROUPS

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At the time of this pilot study, the Clinic Division of Creedmoor Institute for Psychobiologic Studies was concerned with research in the methodology for treatment and diagnosis of family disorder, using families selected for the complaint of a "severely disturbed" child under 12 years of age. The definition of "severe disturbance" was flexible, but the attempt was made to screen for cases resembling the syndrome variously known as "childhood schizophrenia", "early infantile autism", or "atypical child". Such cases are especially appropriate for the family study method since the child's disorder is one in which the relative contributions of environmental influence, and of altered structure and function of the central nervous system are still unclear.

Study of the etiology of the child's maladaptation follows, somewhat revised, the triplicate formulation proposed in the 1952 American Psychiatric Association Diagnostic Manual. The attempt was made to elaborate specifically the genetic, experiential, and circumstantial contributions to the disorder. This led to a study of both the child and his familial context; and in understanding family groups we expanded the general plan originally outoutlined by Ackerman (1) in his work on family diagnosis. The attempt was first to understand the group as individuals with specific genetic patterns, manifested in differential systemic reactivity and tissue characteristics. Second, the attempt was to understand the patterns of these individuals as each had integrated his experience in living with his own genetic and circumstantial contributions before the time of marriage. Third, the attempt was to understand the parents following their marriage, as a marital couple, a parental couple, and a community couple.

One problem in work of this nature was the acquisition of sufficient data as quickly as possible to indicate the directions in which further, more painstaking study must proceed. This was particularly true in the management of an out-patient clinic; for multiple visits by family groups under investigation involved time, expense and disruption of already tenuous patterns of family living.

A rapid method for such a screening evaluation was devised, described by the title of this paper, and abbreviated to the phrase "E-Day". This paper describes an initial methodology and discusses its advantages and significance.

Methodology

This examination required a period of time, one working day in length, during which the father, the mother, and one or more disturbed children were subjected to an evaluation. Prior to E-Day, the social worker furnished the parents with a questionnaire for the child's developmental history, and attempted to prepare them for the length and nature of the evaluation day. Close scheduling was essential, and a timetable for this is indicated in tables 1 and 2.

TABLE 1.—Mother's or Father's E-Day Sequence

	MORNING
8:30	(Somatotyping photographs) (4) CBC Urinalysis, including Tryptest* Serology Blood urea nitrogen Fasting blood sugar
9:00	Family diagnostic interview (both parents)
10:00	Nourishment
10:15	Review of child's developmental history (one parent)
10:45	Pedigree of parent's family
11:15	Psychological testing (Wechsler-Bellevue Form I Abbreviated, Rorschach, Bender-Gestalt Visual Motor Test, Human Figure Drawing)
12:30	Lunch

* "Tryptest" refers to a colorimetric analysis of the urine for the presence of a metabolic derivative which may be of significance in distinguishing between schizophrenic and other individuals.

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TABLE 2.—MOTHER'S OR FATHER'S E-DAY SEQUENCE

	AFTERNOON
1:30	Parent's personal history and mental examination
3:00	Physical-neurological examination
3:30	Dactylography
3:40	(Skull x-rays)
4:00	(Stress-tolerance testing)
5:00	(EEG)

EXAMINATION OF THE PARENTS

While one parent was passing through the sequence of examinations indicated in tables 1 and 2, the other parent was undergoing an identical series of tests at different times during the day.

The operations which are parenthesized indicate procedures we had not been able to schedule during the life of this pilot study. For skull x-rays and EEG's, the patients were referred elsewhere, and we had not yet been able to utilize existing personnel for stress-testing and somatotyping photographs. Performance of these procedures in the E-Day period would have been done when equipment and personnel permitted.

The parents were asked to bring a clean morning urine specimen with them when they came for study. The blood studies were routine, commonly used for rapid evaluation of the serological, renal, endocrine and hematological status.

The parental diagnostic interview was conducted without prior orientation of the couple, and by an interviewer not familiar beforehand with either parent. It was tape-recorded for re-study, and is a procedure based on the assumption that during the course of interviewing both parents simultaneously for one hour the psychiatrist can elicit the data of parental pathology in their roles as marital partners, and as parental and community couple (2).

Nourishment was served by the Clinic's receptionist, providing her with the opportunity to make observations which supplemented the family diagnostic interview.

Review of the child's developmental history was done individually with each parent, using the questionnaire previously furnished, which the parents completed beforehand and returned on E-Day. The separate interviews were an attempt to evaluate the child's development in terms of the inevitable distortions of each parent.

The results of psychological testing were interpreted "blind" by a second psychologist. And the physical and neurological examinations were also carried out without prior knowledge of the parents' history in these areas.

Dactylography (fingerprinting) represented an effort to insure the possibility of follow-up throughout the lives of the individuals since we were trying to design a program which would insure periodic long-term re-evaluations, extending into the aging period.

Stress-tolerance testing, as done by us, utilized the reactivity of the autonomic nervous system, measured during the mecholyl part of the Funkenstein test, as an indicator of differences between individuals, presumably on a genetic basis (3).

EXAMINATION OF THE CHILD

While the parents were proceeding through their E-Day sequence, the child was introduced to the combined psychotherapy-observation room by the therapist to whom he would subsequently return.

During E-Day the effort was made to perform all procedures in as comfortable a manner as possible for the child. Hence laboratory and neurological examinations were done with the parents present unless it was felt that they would contribute to the child's anxiety. If examinations or procedures could not be comfortably carried out on E-Day, they were postponed and scheduled on the therapist's recommendation.

During this first day's visit by the child, psychiatric examination was carried out, and clinical psychology attempted observation of the child's state of developmental maturation, utilizing the one-way mirror and sound equipment of the psychotherapy room.

Subsequent to this rapid evaluation, all disciplines participated in a post-E-Day conference at which participants attempted to communicate their observations and inferences to the others.

DISCUSSION

Some of the advantages accruing to an effort of this kind are as follows:

First, the enormous gain in time for both clinic personnel and family members.

Second, the high concentration of the clinic's attention gave these families an idea of the seriousness of our subsequent therapy and research program better than any orientation sessions could do, and we hoped thereby to keep the defection and broken appointment rate to a minimum. In this regard we noted that the anticipated aversion of the parents to some of the operations of the evaluation never materialized. Instead they seemed to appreciate the difference between this comprehensive approach and the less intense efforts to which they had become accustomed, for every family that applied to the clinic had been to several or more other agencies first.

Third, a rapid estimate could be made of the further tests and procedures indicated to complete the evaluation, and a preliminary program for treatment of all the family members could be arrived at. It should be emphasized at this point that the interpersonal aspect of our subsequent treatment program was based on the assumption that supervised psychotherapy is a legitimate tool of research for the elaboration of the experiential contribution to the family's disorder. In this connection the E-Day approach made it easier for the families to understand why we included fathers and siblings in the treatment plan as well as the patient and mother.

Fourth, the difference in the *kind* of data provided by the entire family being examined together.

The differences in the kind of data obtained are several. The day was sufficiently varied so that many areas of anxiety were revealed to various members of the staff in the marital interaction and parental roles, as well as in the child's relationship to each of the parents. The very length of the day tended to test the parents adequacy in planning for the idiosyncrasies of their sick children, as well as their ability to improvise solutions for the problems that arose unexpectedly. Further, all disciplines observed the family at the same cross section in time, rather than over a prolonged period of time during which changes might have occurred either as the result of therapy, or in the natural course of the illness itself. A final advantage in the kind of data stems from the continuous period of observation of the child. For one day at least, personnel were able to see him in a situation somewhat characteristic of a residential treatment center.

Following all this it may be seen that psychodynamic formulations might be offered, derived from the broad base of interpersonal evaluation by many different disciplines, and that these were unusually complete for such a short period of observation.

Pressing needs arose for improved methods in the standardizing of observations and inferences as well as the communication of these among disciplines. These were especially relevant for the material of the pedigree, psychological tests, behavioral observations, and the family diagnostic interview. Also, several disciplines unaccustomed to conceptualizing their interpersonal transactions with patients were helped to do so: notably the clinic's receptionist, laboratory technicians and nurses.

The inadequacy of current diagnostic formulations has been clearly demonstrated in studies of such family data. Previously, structural disorders in the central nervous system have been evaluated in terms of time, i.e., "acute" or "chronic" brain syndrome, plus the specific circumstantial contribution (trauma, infection, etc.); and functional disorders have been evaluated in terms of symptom patterns. Now we are attempting to replace such evaluations by a series of cross sectional diagnostic formulations which would include the genetic, experiential, and circumstantial contributions as they can be elicited at a given time. However, it is clearly acknowledged that the ultimate clarification of the role of each of the contributions is a process which must go on over an extended period of time.

Finally, it should be noted that this rapid interdisciplinary evaluation tool of the family study method is singularly appropriate to phenomena of maladaption at both ends of the human age period, for inversion of the child-parent relation frequently characterizes the maladapting aged person and his family, and the relative contributions of the genes, experience, and circumstance can be elicited and studied in the same fruitful manner.

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BIBLIOGRAPHY

1. Ackerman, Nathan: Interpersonal disturbances in the family. *Psychiatry, 17:* 359–368, 1954.
2. Chapman, A., and Meltzer, D.: Observation of parental interaction in child guidance methodology. *Psychiatry, 17:* 397–400, 1954.
3. Funkenstein, D. H., Greenblatt, M., and Solomon, H. C.: Norepinephrine-like and epinephrine-like substances in psychotic and psychoneurotic patients. *Am. J. Psychiat., 108:* 652–661, 1952.
4. Sheldon, W., Stevens, and Tucker: *The Varieties of Human Physique.* New York: Harper and Brothers, 1940.

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SIMULTANEOUS OCCURRENCE OF PAGET'S DISEASE OF THE SKULL AND BRAIN TUMOR[1]

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While there are approximately a thousand articles dealing with Paget's Disease (14), we have been able to find only four records of cases of a simultaneous occurrence of Paget's Disease of the skull and brain tumor: two meningiomas (17, 22) one metastatic tumor, and one astrocytoma (5). In the case described below, malignant glioma was associated with Paget's Disease.

Case Report

Mrs. K. B. J., 50-year-old housewife, was transferred to us with the diagnosis of brain tumor from the National Neuropsychiatric Institute. She had a history of having had headaches since childhood and more severe headaches localized over the right side of the cranium during the previous nine months. For the past six months she had been incapacitated, her thinking processes had slowed down, and her gait had become unsteady. For the past ten days she had had urinary incontinence.

Findings on admission. General physical examination was essentially negative. The skull was hypersensitive to percussion on the right frontotemporal region. There was facial paresis of the central type on the left side. Eyegrounds were negative; visual fields could not be tested because of the patient's inability to cooperate. Forced grasping and groping were noticed on the left side. Hemihypesthesia and spastic hemiparesis were found on the left side. There was swaying to the left while standing and walking. Mental examination revealed mild disorientation for time, impairment of memory, lack of spontaneity, inconsistent attention, extreme psychomotor retardation, general lack of interest, and flattened emotional tone.

Laboratory findings. Sedimentation rate, urinalysis, complete blood count, blood and spinal Wassermann, and chest x-ray were all negative. Glucose tolerance test gave a flat curve; serum alkali phosphatase: 10-U (King-Armstrong); blood calcium: 10.6 mg.%; phosphorus: 2.8 mg.%; spinal fluid came with normal pressure, was clear and colorless; cell count: 17/3; total protein: 75 mg.%; Pandy: ++; benzoe: 220666654. Anteroposterior and lateral flat roentgenograms showed a high degree of thickening of the cranium and patchy sclerosis. (figs. 1 and 2). Roentgenograms of the skeletal bones showed no pathological evidence of Paget's Disease. Right angiography showed a circumscribed, strongly vascularized picture in the frontotemporal area, rather basally located (fig. 3).

Since we felt that both the clinical and radiological findings confirmed the referring diagnosis, an operation was performed on April 13, 1955, by Dr. Gatai. Right frontotemporal craniotomy was done. Highly vascularized soft tissues with excessive bleeding from the temporal muscles were apparent. On frontal trephination, the pathologically softened, excessively bleeding bone tissue was exposed. Examination of the removed bone segment showed excessive dilatation of the vessels of the spongeous substance of the highly thickened bone. The branches of the middle meningeal artery were greatly thickened; the dura was hypervascularized. Before the dura could be opened, the patient went into a collapse from excessive loss of blood, despite administration of an adequate amount of transfusion and cardiac stimulants. Therefore it was decided to close the wound and do the surgery in two sessions. Eight days later, a tumor of the size of a small apple, sharply demarcated, lobular in appearance, and moderately vascularized, was removed from the subcortical area of the fronto-opercular region. The patient stood the operation very well, with primary healing of the wound.

Histological examination revealed a highly polymorph giant-cell tumor with bizarre monstrous cell formations with numerous multinuclear cells (figs. 4 and 5). To exclude the diagnosis of monstrocellular sarcoma, reticular impregnation was done by the Foot-Gomori

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FIG. 1.

FIG. 2.

FIGS. 1 AND 2. Anteroposterior and lateral skull roentgenograms showing a high degree of thickening of the cranium and patchy sclerosis.

FIG. 3. Right angiography showing a circumscribed, strongly vascularized picture in the frontotemporal area.

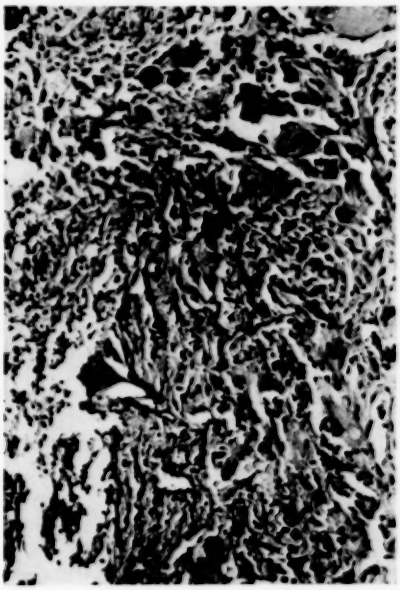

FIG. 4. Section of tumor. Polymorph tumor tissue showing numerous bizarre giant cells. Hematoxylin Eosin stain. Magnification: 80×.

method, showing negative results. By the silver impregnation method many of the polymorph, undifferentiated cells of the tumor tissue gave evidence of neurofibrillum-like branchings; therefore, though the cells contained no Nissl granules, the possibility of a tumor of neurocellular origin was considered. Some of our consultant neurohistologists accepted this as pathological diagnosis, but others felt that it was an unusual form of glioblastoma. Histological examination of the skull gave the typical picture of Paget's Disease (fig. 6).

During the post-operative period, the patient showed rapid improvement both in her neurological and psychological status. A follow-up examination six months later showed only a minimal sensory loss on the left side; the

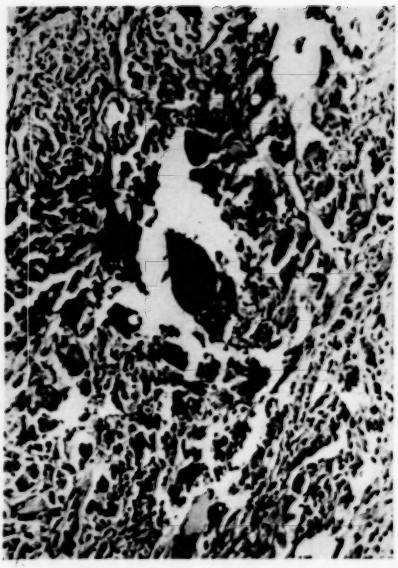

FIG. 5. Section of tumor. Multinuclear giant cells. Hematoxylin Eosin stain. Magnification: 80×.

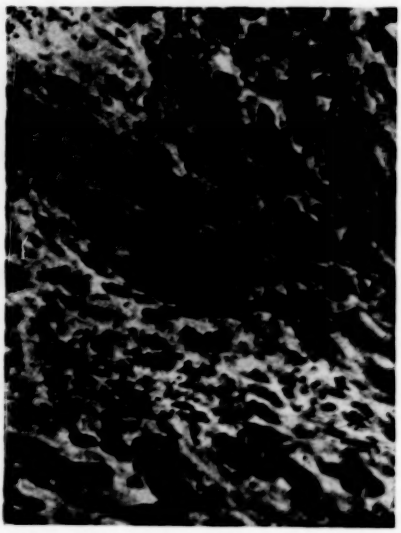

FIG. 6. Section of cranium. Thickened trabeculae show mosaic structure. Marrow spaces are filled with fibrous connective tissue. Hematoxylin Eosin stain. Magnification: 80×.

patient's mental symptoms had cleared up completely.

DISCUSSION

This case seems to be instructive primarily because of the necessity to perform an operation otherwise of relatively short duration in two phases due to excessive hemorrhage. Excessive vascularization of bone tissue in Paget's Disease has been emphasized by various authors. According to Moore (15), in this condition vascularization of the tibia is 2.48 per cent higher than in the normal. Edholm and associates (6) state that the amount of blood flow through the diseased bone in Paget's Disease is twenty times higher than in the normal. In consideration of these facts and our experience, we recommend performing such an operation under directed hypotension.

The incidence of Paget's Disease in the general population, according to Rosenkrantz, (20) is one per thousand, but probably the figure would be higher through systematic bone x-ray screening (2). Kiebock (12) places the incidence as high as 2 per cent. Our case was recognized through the routine x-ray done for cases of brain tumor. In our patient, the less frequent monostotic form (9) of the condition was present.

Quite striking in our x-ray studies and operative findings was the high degree of thickening of the cranium. Courville and Langmade (3) in describing one of their cases point out the fact that the thickening of the skull generally extends in an external direction; according to Hempelman (10) and Da Costa (4), due to internal thickening, symptoms indicating a space-occupying lesion also are present. In our patient, the progression of the condition and the cranial picture primarily pointed to the presence of a brain tumor. Therefore, we feel that in cases of Paget's Disease of the skull, with the existence of space-occupying signs, further studies should be undertaken to explore the possibility of coexisting brain tumor.

Psychiatric symptoms are frequently described in connection with Paget's Disease of the cranium (7, 8, 18, 21). Hirsch (11) believes that this is a chance coincidence with a functional psychiatric disease. However, in our

patient the mental symptoms both in their nature and general course were quite characteristic of those seen in brain tumor.

The occurrence of a basal impression of the cranium has been reported in cases of Paget's Disease (1, 16, 23, 24). This sign is not mentioned in Hirsch's monograph (11) on Paget's Disease, possibly because of its relatively infrequent occurrence. Our patient had a very pronounced basal impression (at present asymptomatic): the tip of the dens epistropheus extends well above the McGregor line. (The McGregor line connects the upper posterior part of the palate with the lowest point of the planum occipitale.)

The pathogenesis of Paget's Disease is undetermined, and there is no well-established therapy. There are reports of favorable effects of x-ray therapy (13, 19). In our case, we used that method post-operatively in consideration of both existing conditions.

Summary

1) This article reports on a case of a 50-year-old female patient in whom the diagnosis of simultaneous occurrence of Paget's Disease of the cranium and brain tumor was pre-operatively established.

2) Because of excessive hemorrhage from the bone tissue, it was necessary to perform the operation in two sessions. It is recommended that in cases of Paget's Disease of the cranium, brain operations should be done under directed hypotension.

3) The tumor proved to be a malignant glioma.

4) In addition to Paget's Disease, there was, in this patient, evidence of an asymptomatic basal impression.

5) If findings point to a space-occupying lesion in conjunction with Paget's Disease, further investigation for the possible presence of brain tumor is indicated.

Bibliography

1. Allison, F. G., and Penner, D. W.: Paget's disease of skull with basilar invagination (platybasia) and internal hydrocephalus. *Canad. M. A. J., 65:* 476–478, 1951.
2. Barsony, T., and Winkler, K.: Pagetsche Krankheit als Nebenbefund. *Rontgenpraxis, 6:* 730–734, 1934.
3. Courville, C. B., and Langmade, C. F.: Significance of neurologic and psychiatric manifestations in presence of Paget's disease of skull; coincidental versus consequential symptoms illustrated by 3 cases with autopsies. *Bul. Los Angeles Neurol. Soc., 12:* 111–138, 1947.
4. DaCosta, J. C.: Paget's disease of the bones (osteitis deformans). *Surg. Clin. North America, 1:* 47–58, 1921.
5. Estridge, M. N.: Paget's disease and intracranial tumor; association of astrocytoma of right temporal lobe with osteitis deformans. *Bull. Los Angeles Neurol. Soc., 15:* 87–92, 1950.
6. Edholm, O. G. Howarth, S., and McMichael, J. Heart failure and bone blood flow in osteitis deformans. *Clin. Sc. Incorporating Heart, 5:* 249–260, 1945.
7. Gross, K.: Zur Klinik der Ostitis deformans (Paget) des Schadels. *Ztschr. ges. Neurol. u. Psychiat., Orig., 73:* 464–474, 1921.
8. Grunthal, E.: Über den Hirnbefund bei Pagetscher Krankheit des Schadels. Zugleich ein Beitrag zur Kenntnis der Entstehung systematischer Kleinhirnatrophien. *Ztschr. ges. Neurol. u. Psychiat., 136:* 656–675, 1931.
9. Halshofer, L.: *Handb. spez. path. Anat., IX:* 3, Berlin: Springer, 1937.
10. Hempelmann, L. H.: Paget's disease of the bone (osteitis deformans). *M. Clin. North America, iv:* 829–834, 1920.
11. Hirsch, W.: *Die Ostitis deformans Paget.* Leipzig: Thieme, 1953.
12. Kienbock, R.: Pagetsche Knochenkrankheit. *Rontgendiagnose d. Knochen u. Gelenkkrankheiten, 6:* 143–539, 1938.
13. Ledoux-Lebard, R.: La radiothérapie de la maladie osseuse de Paget. *Bull. et mém. Soc. d'electro-radiol. méd. France, 26:* 161–164, 1938.
14. Moore, S.: Osteitis deformans; theory of its etiology. *J. Bone & Joint Surg., 33-A:* 421–430, 1951.
15. Moore, S.: Observations on osteitis deformans. *A. J. Roentgenol., 10:* 507–518, 1923.
16. Moreton, R. D.: Basilar invagination; so-called platybasia. *Proc. Staff Meet. Mayo Clin., 18:* 353–357, 1943.
17. Paget, J.: *Tr. Roy. Med.-Chir. Soc. Glasgow, 60:* 37–63, 1877.
18. Riese, W.: Ostitis deformans (Paget) der hinteren Schadelgrube. *Klin. Wchnschr. 10:* 315–217, 1931.
19. Rose, C. B.: Relief of pain by roentgen irradiation in Paget's disease of bone. *Am. J. Roentgenol., 34:* 374–377, 1935.
20. Rosenkrantz, J. A., Wolf, J., and Kaicher, J. J.: Paget's disease (osteitis deformans); review of 111 cases. *Arch. Int. Med., 90:* 610–633, 1952.
21. Stemmermann, W.: Die Ostitis deformans (Paget) und ihre neurologische und psychiatrische Symptomatik. *Deutsche med. Wchnschr. 76:* 1647–1649, 1951.
22. Wolf, A. M., and Black, W. C.: Paget's disease; report of case with intracranial neoplasm. *Rocky Mountain M. J., 37:* 586–587, 1940.
23. Wycis, H. T.: Basilar impression (platybasia); case secondary to advanced Paget's disease with severe neurological manifestations; successful surgical result. *J. Neurosurg., 1:* 299–305, 1944.
24. Wycis, H. T.: Bilateral intracranial section of glossopharyngeal nerve; report of case. *Arch. Neurol. & Psychiat., 54:* 344–347, 1945.

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A CONCEPT OF SCHIZOPHRENIA

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Can schizophrenia, which has many varied forms, be described in a manner that would indicate the way in which it disrupts the personality? Could this then point at its causes, and could therapeutic methods suggest themselves from such an approach? The purpose of this paper is to attempt to answer these questions.

Let us start with basic formulation. The mind is a responsive portion of the body. It resides in and is made up of the elements of the body. The nervous system evolved from primitive beginnings as a reaction of the organsim to its environment. The growth of the brain as an organ for receiving information and acting on it only extended this function, never superseded it. The capacity for abstract thought is still based on the organism's relationship and reaction to its environment. The quantity of its cellular resources makes possible the qualitative interactions that allow the organism to have the widest possible modes of activity and thought.

If the mind is isolated from external stimuli, it is no longer capable of responding to its environment, for the basis of brain activity as an orderly responsive means is not present. This must lead to disruption of the mind's function. Whether or not external stimuli are sent, it can be seen that if the internal physical system does not function, it cannot draw the necessary useful and intelligent information from the environment so as to give a sound response for the benefit of the organism. This means an organism is subject to control on two levels: one is its internal environment and how it affects perception of the external environment; the other is the external environment and its effects on the internal. If the external environment affected the internal so as to cause disorganization and false information, it would be the same as if the internal environment malfunctioned and could not deal effectively with the external. Are there physical signs of this interaction in brain activity? If so, how are they related to the mind-body problem discussed above?

The activity of the nervous system in its final internal form is electrical activity. The basis of this electrical activity lies in the metabolic internal environment. The modulation of this activity resides in the effect of the external environment on this internal environment. There is a balance between the input and output which, kept within proper parameters, results in an effective relationship to the environment. If the internal reaction creates false signals and the organism reacts "falsely", we can say that the regulating feedback of what is perceived and the reaction to that perception is disrupted. Recognition of actual external environment then is not possible. Reality and response do not coincide. This can be due either to the internal environment not reacting because of malfunction or because of the effect of the external environment on it. The results are the same. Because of the number of neurons involved, the *content* of such reactions cannot be deduced from the electrical signs, but the *form* can. Of interest in this connection is the fact that even though the electroencephalogram is just a gross indication of brain activity, various investigators such as Bates (1) have shown that the electroencephalogram changes into a definite pattern immediately before a voluntary movement is begun. Also Livanov and Poliakov (11) showed that there is a relation between electrical brain rhythms and conditioned reflex formation.

Much of this is analogous to a machine, for when looking at a wiring panel layout of a machine, one cannot understand the function of the mechanism. It is necessary to look at the schematic circuit which describes how the system works and in what sequence. Observing the brain's electrical activity is like watching countless relays in operation. How these relays function in an organized sequential manner is the important point.

What is the relationship between the above and schizophrenia?

(a) When an individual's internal circuit malfunctions, he cannot perceive and act upon

external information. There is a breakdown in feedback—useful information may come in, but a lag in the feedback loop may cause an action of the organism to take place after the stimulus has shifted in time; therefore, there is a confused connection between the two. We might say there is a form of sensory ataxia (and if the motor area overlapped, there could be a combination of the two in schizophrenia).

(b) Due to malfunctioning of the internal environment, circuits which are not part of the normal response can also be energized. There is no connection to the proper circuits; contacts in proper sequence cannot be formed; therefore reaction, if any, will be false to the input information.

(c) A spurious signal could be internally generated, causing the reaction to be "false" in relation to reality. This in turn would cause increased disorganization.

(d) Internal malfunctioning would distort incoming information so that a "true" input is never actually recognized. This is similar to point (b) above, and the possible mechanism for this situation has been shown by the inspired and pioneering work of Hoffer *et al.* (7). This group produced model psychosis by the administration to the organism of breakdown products of epinephrine. Inherent in the experiments was the significant fact that these breakdown products could be produced internally as part of the functioning or malfunctioning of the organism.

The work of Hebb (4, 5) and Lilly (10), on the other hand, shows that the external environment, in such situations as isolation, can cause the same type of disorganization as that brought on by the internally administered drugs.

If the external environment can affect the internal, then the type of chemical (and therefore electrical) activity should be common to both, and in fact the external environment should act on the same internal centers—which, if they had malfunctions, could cause similar sorts of disorganization.

Although the Lilly, Hebb and Hoffer-Osmond groups have been working independently in creating model psychosis, it is the writer's thought that there is a close functional relationship between their work. Therefore, it would be necessary to ascertain whether the external environmentally created, model psychosis produced by Hebb, and also by Lilly, creates internally the same breakdown products of epinephrine as the synthetically injected forms of Hoffer and Osmond. The writer in seeking such a test received the suggestion from Hoffer (8) that perhaps as a beginning Leach and Heath's (9) method could be utilized so that plasma or serum could be drawn from the two different groups and their rate of oxidation of epinephrine determined. If a common reaction were forthcoming, one could then infer that external environment can cause the "malfunction" in the production of epinephrine in the human body. One could also then substantiate that the internal system by some defect could produce these breakdown products of epinephrine. In the case of Hebb's work, the gradations of environmental isolation against the production of these products as well as the action of the isolation by Lilly's method might be checked. It is interesting to note that Hebb's gradated means take much longer than Lilly's and are therefore more analogous to environmental situations as we know them.

Electrical potential changes are reflected in sensory responses. The aforementioned work of Lilly and of others has to do with the isolation of the human individual from sensory inputs. Lilly's case, which was the most dramatic, involved the immersion of a human in a tank so that there were few inputs or outputs, and therefore, few "error signals" existed. This underlined the necessity of environmental stimuli in order to have logical thought processes. In the experiments, after some period of time, an individual developed thought fixations and hallucinations. Useful changes of potential do not exist without meaningful visual, auditory, or tactile stimuli, which in turn, in their impinging and complex relationships, develop a type of electric activity allowing for logical and productive thought conceptions. A probable explanation of fixation would be the cortex's developing a percept which would go on an endless feedback because the various balancing activities could not be generated electrically due to the total lack of other stimuli which would normally aid to change the situation.

We will attempt to clarify the formulation

dealing with error detection as we feel that it has significance to the general problem of schizophrenia. Probably the best way of explaining the concept is to answer a question which has been raised (12). How can one best decompensate a system like the schizophrenic one, damaged, but largely compensated? We will discuss this in two phases:

1) Decompensation without concern about restoration.

2) Decompensation with concern about restoration.

In "Servomechanism" terminology, an error signal is the difference between input and output. This difference is used to institute correction so that the output follows the input within preferred limits. One could see that if there was a great difference (error) between input and output and correction could not take place in sufficient time, there would be an unstable system; or, for that matter, if the response was too quick, there could be an unstable system. The conclusion of Hoagland's article is pertinent (6): "It is clear that disturbances in brain chemistry accompany some abnormal conditions of steroid balance and associated with these changes are modifications of conduction rates of nerve impulses and of neurone excitability, i.e., of the timing of events in the nervous system." This justifies one of the points suggested that deals with possibilities of the changing of time of perceptual information in the feedback loop. Reduced to its simplest example, one might see and act upon information which is no longer temporally or spatially present or pertinent. This could distort a person's actions and thoughts in relation to the "real" world.

Now we will specifically answer the question previously raised. If the conduction rates of nerve impulses necessary for certain actions are altered in time, there would be a change of information in the feedback loop, and this would then increase the error beyond the usable range to which the organism can react. The mechanism that the organism would use to compensate for this would be a fixated or compulsive type of attention since the organism is continuously responding to many aspects of its environment and these impinge upon and influence the specific area in which the error relationship is not functioning properly. Therefore, the organism, in order to be as efficient as possible and to save the useful information from being made unintelligible by the influence of other activities, would attempt to be as specific and as limited as possible. The cortical areas would seek to exclude the other sources of information which are attempting to influence it. This would lead in effect to concentration on distorted information.

The above could be experimentally checked by utilizing symbolic, visual, auditory, and stressful responses in normals in a set time and checking schizophrenics to see whether the time reaction would be different. Actually, as a result of the time reactions being different, there also should be evoked a change of symbolism. *The method of compensation then should be the exclusion of any stimulus which by its insertion in the circuit would increase response time involved in the functioning of the primary stimulus.* In other words, stimuli which distract from the object of primary concern would tend to be ignored. While this might lead to, for example, a better compensation for visual problems, the total over-all response of the organism would suffer. The methods of decompensation would be not to allow the other stimuli to be shunted aside, so that while a schizophrenic was being given a test of the sort suggested, one would introduce auditory, tactile and emotional stimuli in a disturbing manner. The normal should compensate very well up to a certain point; the schizophrenic should be worsened by such an experiment. It is much like giving a test to a person with a cerebellar lesion, which requires him to rapidly reverse the palm of his hand from a downward position to an upward position. With a cerebellar lesion, assuming that the cerebellum is an error detector, one should expect that this process would be unsteady, difficult and slow. With a schizophrenic, the flashing of cards, for example, in rapid order should demonstrate an analogous sensory reaction.

Up to a certain point other stimuli beside the primary one act beneficially, for, by raising the activity of the central nervous system, they in effect shorten the response loop and therefore aid in overcoming the lag that we spoke about in the feedback circuit. The cortex in an attempt to get this shortened loop or good error response might call up various emotional

responses which in turn could affect its activity. This is where the psychic component, which we will discuss later, that has to do with the mind seeking to find rational causes for irrational experiences, would enter as this would certainly increase activity to a point. A certain amount of tension would be helpful, for it acts as a bias to the incoming signals, much the same as when one wants to elicit a knee jerk and, finding it difficult, asks the patient to clasp his hands and pull. This raises the level of activity of the central nervous system which in effect lowers the neural thresholds and allows the reflex action to be accomplished. This additional excitement, if continued by the organism in its attempt for more efficiency, would rapidly lead to a great deal of agitation or silly and useless activity and, of course, become a vicious cycle because of the effects of such activity upon the humoral functions of the organism.

Regarding hyperactive and agitative behavior, a mind which for whatever reasons has a high level of "noise" (that is, information impinging upon the central nervous system which cannot be integrated with the activity that would be going along in the various active loops) would act to lower thresholds in many interlocking neuronal elements which, if not resolved, could lead to a great deal of environmentally unrelated activity. We could then say that the *primary environmental error information* or the meaningful signal becomes diverted, dissipated or lost so that the resulting output action seems to have little bearing on the input situation. If the situation is thus disorganized, then after some amount of excitemental activity, the organism would become so disorganized that it would attempt to cut off all incoming signals. This sort of catatonic response is a means of self-preservation.

One must recall that a concept is formed in the cortex. We will call this the input. There are no other impinging stimuli which would tend to shift the attention of the subject from the prevailing thought. In normal life many fleeting thoughts can pass through the mind, but the environmental situation, with its multitude of distracting stimuli, can shift the thoughts to other channels which the stimuli can unconsciously or subliminally suggest. In cases of isolation, however, somatic changes which can accomplish various thoughts cannot take place. These may range from the unconscious turning of the head to view an object to actually taking physical action to accomplish a purpose. These can be considered outputs. The difference between input and output, which is the individual's check on reality, is either non-existent in the situation described, or so large that corrective changes cannot occur. This would be especially true, for example, of motor action in response to a desire. The input would be the initial desire; motor action would be the output. The result of the motor action would have to satisfy the desire in order to be fully completed. We would therefore consider the result or the difference between input and output as the error signal.

Another example: An individual in a state of disorganization can feel isolated even when in a group if the *group does not act as a stimulus to him*; that is, if he feels strange or alienated from those with whom he is in contact. Strange and fixed thinking could take place because even though there presumably are stimuli, the individual cannot receive them. Due to internal malfunctioning, stimuli are not perceived properly. The result is the same as if there were no stimuli at all.

Let us further clarify this conception. It has been mentioned that foreign students are subject to psychotic reactions more frequently than should be the case (10). In such instances there would not be internal malfunctioning, but the external stimuli would not be meaningful as the interpretive and perceptive mechanisms would not function on any reliable basis. There is no proper perception of stimuli, which is the same as no stimuli at all. The reaction is the same as if there had been an internal malfunction which distorted the reception of the stimuli. As we have pointed out, the brain operates on information it receives whether or not that information reflects actual conditions.

Hallucinations could be generated by electrical activity which by statistical chance, aided by reduction of meaningful stimuli, could join together with other potentials so as to cause signals having no relationship with reality. These would be much like the hallucinations created by the drugs of Hoffer and Osmond and like those which Penfield (13) was able to elicit by stimulation of the ex-

posed cortex. A self-evident axiom would be that anything which affects threshold will affect information propagation.

In other words, a person may perceive the world distortedly because of his internal environment and therefore act in a distorted way; or the external environment may cause internal changes which bring about the same sort of distortions. The important point is that distortion can cause isolation of the individual. At this point, one can then postulate that isolation can cause further psychosis (through the production of psychotic-forming secretions), and this process can keep on in an ever-increasing manner.

We will propose a description of how this action is translated into electrical signals and how the distortions take place, keeping in mind that we are not describing the relays *but the connection* between them. The manner in which they are energized could allow input either to correspond or not to correspond to output.

We think that abnormal electrical activity can cause a schizophrenic episode. Penfield, whom we have mentioned, found in stimulating the exposed cortex that he could produce hallucinatory states. Electrical activity then, whether externally or *artificially* induced, can cause hallucinations. Sem-Jacobsen *et al.* (14), reported on intracerebral recordings in chronic psychotic patients, found that *internally* or "naturally" produced electrical activity coincides with the hallucinations. He localized this in the temporal lobe and probably the frontal lobe. It is important to emphasize that in both Penfield and Sem-Jacobsen's work we find that one can "synthetically" evoke the same sort of results that were "naturally" produced in a localized cortical area (temporal lobe).

Of course it can be said that electrical activity is the result and not the cause of psychotic activity. Such a discussion would not be productive, for the results are the same. One may observe a nerve impulse as a result of biochemical activity or initiate it through electrical activity. Whatever the cause, the nerve impulse is still the final physical phenomenon that has communicative value and initiates activity.

Because of the previously quoted work on model psychoses, we should be able to assume that schizophrenia, like epilepsy, can be induced in anyone. Let us go a step further and state that schizophrenia is nothing more than the outbursts of electrical energy caused by chemical action which affect the sensory system so as to give spurious information for the individual to act upon. Where the outbursts involve mostly motor areas, we have a form of epilepsy. Where sensory areas are mostly affected, we have a form of schizophrenia. Since these areas overlap, one may find forms of epilepsy that have schizophrenic signs, and schizophrenia which has epileptic signs. Into this same category could be put other disorders whose causation has not been clearly determined, e.g., various gastrointestinal disorders which, utilizing this concept, could be explained as being innervated by discharges originating from some of the centers that cause disturbances we have mentioned above. When schizophrenics or others suffer from complaints such as abdominal pains, they are quite often considered to be afflicted with a form of hysteria (7). When hysteria is not the diagnosis, there may even be surgical intervention to discover the trouble. Many times there do not seem to be organic causes. It is our opinion that such symptoms are part of the over-all condition of some schizophrenics and are not a form of hysteria. In using a generalized term like hysteria, we are attaching an imposing label to ignorance; for electrical activity, which may be spontaneous and can cause such activity as hallucinations, can also energize portions of the cortex dealing with visceral functions. We know that electrical activities which affect portions of the cortex, such as the insula and the temporal lobe, are quite close to the hallucinatory centers.[1] Therefore, electrical activity could innervate, in many cases, not just that part of the cortex dealing with the senses but that part which controls circuitry to various organs. Such a fact could then explain heretofore unexplained data as presented by Penfield and Jasper (13), in describing a case where "The alimentary symptoms were combined with varying evidence of spread to neighboring areas of cortex: second sensory phenomena, gustatory sensation,

[1] We use the term "centers" as a descriptive term, fully realizing that it is also the interrelationship between the centers which is important in behavior.

psychical illusion, olfactory sensation. All of these phenomena depend for their existence upon discharge in areas of cortex that border upon the insula." In noting this, they said, "It is interesting that in this case there were complaints of nervousness also. He described a feeling of tension within himself that he found trying and hard to tolerate while carrying on his life. Some such description is not unusual in these cases. Minor peculiarities of behavior have appeared in other cases." Since cases such as these in no way have been tied to schizophrenia, we intend to do just that.

Emotions like those described above are the result of electrical activity and discharges, the discharges of course being followed by altered forms of electrical activity, just as the state previous to discharge is important to and is altered by the engendering of the discharge itself. In epileptics this may be a temporary phenomenon associated with the discharge itself. However, this should indicate the mechanism for mood; for if these potential levels were of a sustained type, not necessarily involved with the specific discharges, the results should be analogous. Rather than having a temporary episode such a situation could be continuous. In other words, if we consider potential levels and local activity alone, and do not involve ourselves as to whether a spike activity would cause such levels (or result from them) but merely assume that these levels existed for whatever reasons, it would be logical to assume that there would be certain emotional behavior connected with local activity and with the potential levels in various areas of the cortex which influence nervous system activity. The fact that threshold is affected by such activity would have a great deal to do with the visual changes associated with schizophrenia.

We might include gastrointestinal and epileptical conditions which we have described previously in the same family by the following definition: *Conditions in which there is electrical activity of neuronal pathways which are energized in a needless manner for functions not normally in the input-output circuit called for by a particular environmental situation constitute a general group which would include epilepsy and schizophrenia.*

Since schizophrenia can involve (depending on its severity) a continuous distortion of the sensory system, it, too, like epilepsy must have its gradations.

It can be mild and therefore be the "tick" of the sensory system and in effect self-limiting, or it can be greatly increased in involvement through diverse means. One of these ways is as follows: since man is an abstract thinker, he attempts to find rational explanations for his plight (12). The disparity between a reality that he knows has existed and the distortions he now perceives can cause the panicked collapse and the confusion of the entire process of mentation, which we have previously suggested causes further alienation and isolation from the environmental situation that had been protective to the individual's personality.

The distortions can become the only reality to the individual who seeks to adjust his mode of living to them. Unable to perceive reality, he lives in the only world real to him, the only world he can perceive. This perverted homeostatic function protects the individual from death. But this twisted feedback can result in the locked sense of immobility (catatonic state) which any feedback can assume when input and output loop falls in too close a time period for any reaction to take place. Chaotic action can take place where the loop is too large and correction seeks to take place against an ever-increasing error. The "locked" system can actually be a protective measure to prevent the physical destruction of the system through wild oscillation. The motor system can only be convulsed for a limited period of time. The sensory "convulsion" may be a continuous process without cellular exhaustion, for it does not utilize any metabolic energy which cannot usually be replaced.

It is well to keep in mind that in the brain the heat production—and therefore energy involved in mentation as a result of cellular action—does not increase in a manner that we would expect since the cells are always at work. This energy is a result of metabolic action. It is their degree of area synchronization which is affected. It is this interaction between the neurons which is the salient feature in intelligence communication in the brain.

It is assumed that in a state of shock, such as concussion, all electrical activity ceases in the brain. This manifestly could not be true.

The individual cellular metabolic activity still continues and electric potentials still exist. Instead of assuming that there is no electrical activity, we should accept the reverse as being true: that there is continuous unorganized activity firing simultaneously. Therefore it must be canceling itself out electrically as well as raising potential levels to an extent that there is saturation of neurons to working information, so that no new signals can proceed through until the level has reached a point where threshold action is again enforced.

The neuronal basis of schizophrenia can be postulated from the following: Epinephrine-type drugs have actions which affect neuronal excitability. This means that they change the threshold of response. If threshold is changed, interactions between neuronal units would result in some neurons being made part of new operating systems and disrupting the functioning of old. There is of course every reason to believe that the new interconnections would be haphazard and not beneficial. (It is in a sense like a mutation.) The new combination results in actions of the nervous system which, if they were to be a preferred form of action, would have been developed consequently through evolution. Confusion of thresholds, depending upon their localities, would cause changes in the portions of the nervous system which are affected. For example, the visual system could be involved or the sympathetic and parasympathetic systems could be involved, depending upon which neuronal areas are affected by threshold changes.

Using the autonomic nervous system as an example, this diffuse energization when not needed by the environment could in turn result in hormonal secretions which normally would not be in the circuit and therefore would be additive and stimulate an already illogically excited situation. Before an epileptic seizure, the mood changes; and after an epileptic seizure, mood changes. According to our theory, the potential level is at a certain point prior to actual specific discharge and at a different point after the discharge. It can be seen that such changes of potential must affect other neuronal pools normally in balance with the circuit's operation, i.e., the organism's normal reaction. Moreover, it should be pointed out that the possibility of direct current potential shifts in the cortex may have some importance in schizophrenia as potential changes have been found to effect epileptiform seizures in cats (2). One of the results of shock therapy presumably is that it imperfectly affects, due to its random and haphazard action, the neuronal potential levels as well as the organization or disorganization of discharges between neurons themselves. One could ascertain specific direct current changes of brain activity before and after shock therapy; and if such a change took place, one would then say that neuronal thresholds were sufficiently altered so that certain thresholds were raised. Since shock appears to be a temporary aid, there is a strong suggestion that metabolic activity (gradually in some, rapidly in others) acts to lower thresholds of certain areas. It would seem then that any biochemical activity which tends to lower thresholds could be correlated with altered electrical action. This probably is being checked experimentally in various laboratories. Also, we know that schizophrenia can be a continuous disorder, or at least episodes can be of long duration. This would indicate that direct current potential changes which are long lasting must result from sustained or long-lasting humoral activity.

Epileptiform seizures which involve motor areas can be considered a discrete phenomenon, for there can be sharp localization of neuronal pools which control motor activity. Schizophrenia, having to do with mood, however, should not for the most part be considered a discrete phenomenon but an electrical bias activity, as a result of which potentials and therefore threshold levels of various neuronal pools are affected in their response to each other. The diseases are actually portions of the same spectrum of abnormal nerve activity, and their titles of "schizophrenia" and "epilepsy" are arbitrary divisions made at a time when no connection was inferred. Aiding in integrating the two is the knowledge that degraded epinephrine has been found to produce changes of epileptic behavior (3). Epilepsy, then, is more a discrete activity of a group or pool of neurons as they fire. Schizophrenia is more reflected in the relationship between the neurons in a pool which finally control the triggering and the pattern of firing.

It can be seen that they are varying parts of the same mechanisms. Some forms of epilepsy are the "discrete" reactions growing out of a wave action. Some forms of schizophrenia are the "wave" actions which can result from the discrete activity (but need not); they can also be part of that activity which precedes the discrete activity. In any case any unusual buildup of activity or massive neuronal discharge will of necessity affect subsequent potential level, and therefore the organism's activity regarding mentation and motor activity would be affected. It should be clearly understood that we are using the arbitrary distinctions of medical authority. In reality such terminology should be modified. In epilepsy the mood changes which occur before and after attack should be considered and, if need be, labeled for what they are—a schizophrenic reaction. The fact that these mood changes always go with epilepsy only indicates their electrical origin. We reiterate that the electrical sign is originally generated by metabolic, therefore chemical, action. However, once that action takes place, it can, through further electrical spread, involve many groups of neurons.

There is a challenge here to analyze the concept which roots the causes of schizophrenia in childhood experience, which "tapes" the individual's responses. This hardly coincides with modern concepts which regard the nervous system as a dynamic thing, which is continuously and at all times reacting to the environment. There is evidence that the nervous system does not entirely mature until early adolescence. We believe that firm, established pathways of behavior cannot be entirely established until myelination is entirely complete. These physiological considerations may even suggest that behavior of the growing child is qualitatively different from that of an adult, and that what could be accepted in a child as various normal forms of thought could be labelled as schizophrenia if present in an adult. This would not affect the intelligence potential, which is the greater use of neuronal facilities, but rather the perceptive circuits which would depend more upon the method of interaction than on the amount.

In reference to hormonal development, Fisher (3) has dramatically pointed out the effect of chemical stimulation of the brain on the behavior of rats. Of course this was an experiment where one intervened artificially with the organism. However, it points up the importance of hormonal influence in the brain for the formation of behavioristic action. There is also a clue here in the fact that mental illness often occurs at adolescence, menopause and pregnancy, or any period where body chemistry is in a state of change. If electrical activity or potentials were altered during these events, one could attempt to correlate the change with specific endocrine activity.

An individual is always interacting with his environment. The effect of environment on the nervous system, then, is a fluctuating threshold-involved process which can at any time, under proper circumstances, be changed. Therefore, environmental control as a form of therapy, both interpersonal and institutional, is an area which must be investigated in a much more intensive manner. It would seem that the debate between organic and analytical psychiatry could in a large part be resolved if we recognized that organic effects can be the result of environmental simuli and, therefore, the interpersonal element which some schools accent can be viewed as another form of stimulus which engenders various organic actions.

BIBLIOGRAPHY

1. Bates, J. A. V.: Electrical activity of the cortex accompanying voluntary movement. *Electroencephalog. & Clin. Neurophysiol., 2:* 227, 1950.
2. Cooke, P. M., and Snider, R. S.: Some cerebellar influences on electrically-induced cerebral seizures. *Epilepsia, 4:* 19–27, 1955.
3. Fisher, A. E.: Maternal and sexual behavior induced by intracranial chemical stimulation. *Science, 124:* 228, 1956.
4. Hebb, D. O.: The mammal and his environment. *Am. J. Psychiat., 111:* 826–831, 1955.
5. Hebb, D. O.: Drives and the conceptual nervous system. *Psychol. Rev., 62:* 243–254, 1955.
6. Hoagland, H.: Steroid hormones and events in the nervous system. In *Neurochemistry.* Elliott, K. A. C., Page, I. H., and Quastel, J. H., Eds. Springfield, Ill.: Charles C Thomas, 1955, pp. 756–784.
7. Hoffer, A., Osmond, H., and Smythies, J.: Schizophrenia: A new approach. II. Result of a year's research. *J. Ment. Sc., 100:* 29–45, 1954.
8. Hoffer, A.: Personal communication.
9. Leach, B. E., and Heath, R. G.: The in vitro oxidation of epinephrine in plasma. *Arch. Neurol. & Psychiat., 76:* 444–450, 1956.
10. Lilly, J. C.: Mental effects of reduction of ordinary levels of physical stimuli on intact, healthy persons. Psychiatric Research Reports No. 5, American Psychiatric Association, June, 1956.

11. Livanov, M. N., and Poliakov, K. L.: Electrical processes in the rabbit's cortex during the development of a conditioned defence reflex in response to a rhythmic stimulation. Akademiia Nauk SSSR. Seriia Biologicheskaia. Izvestiia, (English Summary—p. 307), 1945.
12. Osmond, H.: Personal communication.
13. Penfield, W., and Jasper, H.: *Epilepsy and the Functional Anatomy of the Human Brain.* Boston: Little, Brown & Co., 1954.
14. Sem-Jacobsen, C. W., Petersen, M. C., Lazarte, J. A., Dodge, H. W., and Holman, C. B.: Intracerebral electrographic recordings from psychotic patients during hallucinations and agitation: Preliminary report. *Am. J. Psychiat., 112:* 278–288, 1955.

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REVERBERATING CIRCUITS

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The concept of reverberating circuits in the brain is supported on both anatomical and physiological evidence. Lorente de Nó summarized his views in the 1943 edition of Fulton's "Physiology of the Nervous System". "The cortex is considered as a chain of neurons built on the plan of reflex arcs.... The assumption lies to hand that the impulses circulating through the vertical chains are synchronized.... At certain phases of cortical activity the cells fire off in more or less synchronous volleys of impulses." Since these chains include closed loops, and since by virtue of the all-or-none law a neural impulse suffers no decrement in its passage, there were to hand the necessary anatomical connexions which could maintain a neural impulse in a closed circuit, a circuit which could be convincingly demonstrated under the microscope. Furthermore, the concept of closed circuits, being now established as a percept, furnished the psychologist with at least the groundwork of a theory of memory. This view, first put forward by Rashevsky (16), has been substantially developed by Hebb (9), Gerard (6) and Eccles (5).

Physiologically, the electrical rhythm of the brain is accepted as evidence of synchronous pulsations of the cortical cells. The dominant (alpha) frequency is 10 per second. Synchronicity of cortical cells was thus held to involve the repetitive transmission of neural impulses, which returned in due course (that is in about 100 milliseconds) to their cells of origin. A major discrepancy, however, was left unexplained: if the speed of a neural impulse is reckoned at 100 metres a second, the 10-per-second alpha rhythm demands a circuit of no less than 10 metres, disregarding synaptic delays which are of the order of one millisecond. The micro-circuits of Lorente de Nó, with a length of less than one millimetre, would be limited only by synaptic delay and would carry an impulse 1,000 times a second.

This theory is now falling into disrepute. At the Laurentian Conference (1953), a high-water mark of neurophysiology, Lorente de Nó was reported to be of the view that "the distribution of recurrent fibres is such that the probabilities of reverberating activity are vanishingly small. There are so few connections from any one cell to any given cell, that the only chance of getting reverberation is by complete organization" (4, p. 236).

With the ground thus cut away from a scientific theory on which a great deal of informed speculation has been erected, it is well to be reminded that independent evidence from the physiology of muscle demands, and indeed unequivocally demonstrates, the existence of reverberating circuits, at least in the spinal part of the nervous system. A key station on each circuit through nerve and muscle is the stretch-receptor associated with the muscle-spindle, embedded in the bulk of the muscle.

The stretch-receptors of the postural muscles supporting the limbs are sensory nerve-endings in the muscles spirally wrapped around a few short and ill-developed muscle-fibres which form a spindle. These intra-fusal fibres (*fusus* a spindle) although degenerate, or perhaps embryonic, still possess the power of contraction; this however contributes nothing to the total output of the muscle: intra-fusal contraction is an internal affair concerned solely with the mediation of feed-back.

The motor nerve-supply to the spindles is independent of the main supply to the muscles. There are indeed in the mammal two separate systems of efferent nerves transmitting some species of motor impulses. The two systems are distinguished by the size of their fibres: the large-nerve system is the main outflow and controls the shortening of the muscle, the small-nerve system reaches only the intra-fusal fibres. The sizes of these nerves, large and small, are invariant throughout the mammalia: in elephants, humans, cats and guinea-pigs the range of diameters is the same, from about 20 microns to 3 or 4 microns or less (8).

In the resting muscle there is a considerable

discharge of outgoing motor impulses to the fibres within the muscle-spindles. This sets their receptors on the stretch, and provokes a constant stream of afferent impulses fed back into the spinal cord (11). The outflow from spinal cord to muscle-spindle is itself under reflex control by impulses from the skin and muscles, and this in its turn regulates the input. "In normal function a combination of afferent discharges from skin, muscle and probably other deep structures will regulate the small-nerve activity to muscle. The pattern of skin stimulation may be of particular importance in this regulation" (11, p. 469).

There is thus a reverberating circulation of neural impulses constantly travelling up and down the two sides of the reflex circuit, into which (it is believed) are fed sensory impulses from the skin. This circuit, it must be emphasised, is maintained even during apparent muscular inactivity. "Many small-nerve fibres show a considerable background discharge even to a 'resting' muscle. This continuous activity is certain to influence the afferent spindle discharge, in addition to external stretch" (13).

The circularity of this pathway through muscle and spinal cord is evident from two quotations of Hunt's paper. "A large proportion of small-nerve [efferent] fibres show a background discharge to 'resting' muscles. Such small-nerve activity will increase the afferent response of the spindle to external stretch" (11, p. 468): in short, the efferent discharge increases the afferent. "The background activity of small-nerve fibres to hind-limb muscles depended on the flow of afferent impulses to the lumbo-sacral cord" (11, p. 460): in short, the afferent discharge maintains the efferent. The circuit is closed, self-exciting, self-maintaining, reverberatory.

It is of supreme import to the present argument that these reverberating impulses can circulate throughout the bulk of the muscular system independently of voluntary contraction. They concern only the intra-fusal fibres and have no direct influence upon the effector fibres lying outside the spindles. Their ceaseless activity is maintained (during waking hours) as a virtually inexhaustible reservoir of neural energy, even though the general musculature of the body is completely at rest. "Light touch to the skin of the ipsilateral foot [of a cat] produced a mintained discharge in the small-nerve fibre .... Accompanying this small-nerve activity there was a striking increase in the sensory discharge recorded from the muscle. No muscle contraction occurred and the muscle remained at the same resting tension" (11, p. 461).

Apart from their theoretical importance, the discovery of these reverberating circuits traversing the tissues of the muscles has a bearing on clinical medicine. It is possibly the interruption of these reverberating circuits at the muscle-spindle end by injections into the muscles (such as of diphtheria prophylactic, whose aluminum substrate remains a foreign body *in situ* for some days) which renders the injected muscle peculiarly susceptible to infantile paralysis should an epidemic be current. The target of the poliomyelitis virus is believed to be a dehydrogenase of the anterior-horn cell; and the continued well-being of this cell is dependent, it must be assumed, upon its wonted influx of kybernetic refection from its proper muscle-spindle. It is this influx which is interfered with by intra-muscular injection, thus leaving the motor-horn cell open to attack. Were the injection placed in the inert fat beneath the skin instead of into the dynamic tissues of the muscles, the risk would be obviated.

The consensus of opinion is that only those injections are dangerous that are absorbed onto an inert substrate such as alumina (for the purpose of prolonging their effect), and that the risk of poliomyelitis passes off with the slow disappearance of the substrate from the tissues (10, 14). The danger is greatest during the second week after the injection, and has passed at the end of a month or six weeks (2). In the Los Angeles epidemic of 1948, involving 1,321 cases, 30 had received an injection within 34 days of onset, the average interval being 10 days (7). Injections of simple solutions such as liver and insulin appear to be harmless, although insulin *ultralente* might be suspect.

The mechanical properties of reverberating circuits have not been given the attention which is their due. It is no doubt a relic of the dualistic philosophy of mind and brain that has led to the belief, implicit in all writing but never avowed, that the alpha rhythm, being presumably a mental or at least an

insubstantial phenomenon, is immune from the Newtonian laws of matter and motion. To assume, as is always done, that the blocking of the alpha rhythm is a purely "psychological" effect, with no concurrent energy-change in the oscillating system, is mathematical nonsense.

That the disappearance of the alpha rhythm is an active, positive process, and not merely a fading away by dissipation in the tissues, is indicated by the rapidity, approaching instantaneity, of its inhibition. A flash of light in a darkened room will abolish the 10-per-second alpha rhythm in 0.287 seconds—less than three complete cycles of the beat (12). Moreover, the waves do not disintegrate; they reduce their amplitude in orderly succession (by about 20 microvolts a beat), still keeping their rhythm, until the height of the wave has fallen to zero. The same effect, in reverse, obtains on the return of the waves with the cessation of cerebral activity: it is an organized build-up and not a mere resurrection of rhythm out of noise. The falling out of step of a myriad of cells in less than three of their natural periods indicates the active intervention of an interrupting, braking, or inhibitory process applied to each unit, rather than the passive decay of their concerted wave merely by some process of natural dissipation or fatigue.

It has been maintained, however, that the disappearance of the alpha rhythm involves no more elaborate machinery than the severance of an essential link in the chain of participating neurons. It has been postulated "that the alpha rhythm results from the repetitive action of cells in neurone chains, that it can be disrupted by any agent which inactivates a link in the chain, and that it is thrown out of synchrony by the arrival of action potentials originating as sensory impulses" (3).

This does not take fully into account the fact that it is not one essential link in one neuron-chain that has to be severed, but perhaps a million essential links in a million neuron-chains, each needing a synchronized severance at almost the same instant of time. Assuming that the necessary severance could be effected by a single neural impulse arriving at each link, what is the fount of instantaneous issue of those million permeability-waves? Waves of energy, even those of neural energy, cannot arise out of nothing, and there is no part of the central nervous system which has the power of explosive utterance on a scale of this magnitude—witness the slow build-up necessary in the case of certain of the postural reflexes, a build-up needing as much as 10 seconds in some circuits.

Even if the marshalled ranks of pyramidal cells in the hippocampus be credited with the power of discharging a synchronous volley, whence comes the signal that fires them simultaneously in their millions? Electrical disturbance travels over the cortex of rabbit-brain at the rate of three or four centimetres a second (1), and the spread of Jacksonian epilepsy shows that the human rate is not greatly different. A higher rate of travel has been observed in the auditory cortex of the cat, attaining a speed of 150 centimetres a second; but the distance covered was only one centimetre (15). The human hippocampus is several centimetres long: local spread of an excitation here can be ruled out of the question, as regards the blocking of the alpha rhythm in less than one-third of a second.

It is, however, an unjustified assumption that has been made (that severance could be effected by a single impulse), for the alpha wave fails (after a single flash of light) by three successive decrements, spread over a matter of 287 milliseconds; it reappears in the same fashion, suggesting that during its time of failure it has been subject to a continuously suppressing influence, needing presumably a continuous influx of neural impulses arriving along a million separate channels. To suggest that this sustained inhibitory influence emanates from a single visual flash is an assumption quite unsupported by collateral evidence. On mechanical grounds alone it is necessary to postulate the existence of a sustained volley of inhibitory impulses, or a sustained deflection of the alpha rhythm itself into other circuits. The dynamic of this sustention cannot be sought in the sensory cells of the retina.

It is necessary therefore to postulate a hitherto unsuspected source of neural dynamic which is able to effect this suppression of the alpha rhythm, a suppression which is both instantaneous and sustained. A similar fount of inhibitory dynamic must be postulated to

account for the sustained suppression of the muscular circuits during reflex and voluntary movement.

Summary

Reverberating circuits in the brain have been postulated, supported by histological and electrical evidence, and denied on statistical grounds. Independent evidence is adduced from muscle-physiology, which has demonstrated the existence of reverberating circuits, travelling up the large-fibred afferent nerves and down the small-fibred efferent nerves, maintained in being by the stretch-receptors of the muscle-spindles.

Damage to the muscle-spindles by injection of alumina (as in diphtheria prophylactic) will damage the refectory circuit to the anterior-horn cell and lessen its resistance to poliomyelitis.

The mechanical properties of such circuits are considered, including those of the alpha rhythm. An oscillatory neural cycle carries a momentum and cannot be extinguished without a physical redistribution of neural energy. The implications of this are considered, and the existence is postulated of a hitherto unsuspected source of inhibitory dynamic to account for the suppression of the alpha rhythm, and the suppression of postural circuits on reflex and voluntary movement.

BIBLIOGRAPHY

1. Adrian, E. D.: Spread of activity in the cerebral cortex. *J. Physiol.*, *88:* 127, 1936.
2. Banks, H. S., and Beale, A. J.: *Brit. M. J.*, *2:* 251, 1950.
3. Brazier, Mary A. B.: *J. Neurol. Neurosurg. & Psychiat.*, *11:* 118, 1948.
4. Delafresnaye, J. F. (edit.): *Brain Mechanisms and Consciousness. A Symposium.* 1954.
5. Eccles, J. C.: *The Neurophysiological Basis of Mind.* London: Oxford Univ. Press, 1953.
6. Gerard, R. W.: Physiology and psychiatry. *Am. J. Psychiat.*, *106:* 161–173, 1949.
7. Goerke, L. S.: *California Med.*, *74:* 5, 1951.
8. Häggqvist, G.: Nervenfaserkaliber bei tieren verschiedener grösse. *Anat. Anz.*, *96:* 398, 1948.
9. Hebb, D. O.: *The Organization of Behaviour.* New York: 1949.
10. Hill, A. B., and Knowelden, J.: *Brit. M. J.*, *1:* 1, 1950.
11. Hunt, C. C.: The reflex activity of mammalian small-nerve fibres. *J. Physiol.*, *115:* 456–469, 1951.
12. Jasper, H. H., and Cruikshank, R. M.: Visual stimulation and the after-image as affecting the occipital alpha rhythm. *J. Gen. Psychol.*, *17:* 29, 1937.
13. Kuffler, S. W., and Hunt, C. C.: Mammalian small-nerve system. *A. Res. Nerv. & Ment. Dis.*, *30:* 41, 1952.
14. MacCullum, F. O.: *Brit. M. J.*, *2:* 6, 1950.
15. Mickle, W. A., and Ades, H. W.: Spread of evoked cortical potentials. *J. Neurophysiol.*, *16:* 608–633, 1953.
16. Rashevsky, N.: *Mathematical Biophysics*, 1st & 2nd Ed. Chicago: 1938, 1948.

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POSTURE AND THE RHINENCEPHALON

A New Interpretation

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The maintenance of static posture is a dynamic process. The tonus of the anti-gravity extensor muscles is kept in being only by a ceaseless flow of neural impulses both to the extra-fusal fibres or main contractile tissue of the muscle-belly, and to the intra-fusal elements of the muscle-spindle. These small elements are insignificant in size and bulk (about 1/10,000 that of the muscle itself), but they are essential for the mediation of feed-back .From the stretch-receptors coiled spirally round the intra-fusal fibres, an equally ceaseless flow of sensory impulses which are necessary for the continued maintenance of the outflow is returned to the spinal cord. A reverberating circuit is thus set up on waking, and neural impulses continue to circulate until the cessation of muscular tonus which is characteristic of sleep.

A reverberating circuit is a cyclical or oscillatory phenomenon, and carries therefore a moment of inertia or rotational momentum. Even so humble and lowly organized a rhythm as the nightly folding of the leaves of the sensitive Mimosa plant has a momentum which carries it through several days when the plant is kept in a constant environment (14). This mechanical truth will be appreciated best, and perhaps fully only by those who have handled a gyroscope, and who have sensed the difference in the feel of the thing when the rotor is at rest and when in motion. To imagine that the dynamic circuits of muscle-posture can be instantly put out of action, and replaced by an altogether different pattern of response, without the application of a specific quantity of energy, is as fallacious as to think that a rotating gyroscope can be lifted and handled as easily as a stationary flywheel.

Nevertheless, there are occasions on which static posture must instantaneously be altered to meet an emergency: for instance, a gravitational emergency. The lightning movements of a falling cat demand the instantaneous suppression of postural tonus, and its immediate replacement by an orderly sequence of movements reflexly controlled from entirely different neural centres.

The pathways down the brain-stem by which this replacement is effected have been fully explored within the last decade. They constitute the reticular suppressor system of Magoun and Rhines (9). Electrical stimulation anywhere along these extra-pyramidal tracts will suppress all muscular tonus and yield an instantly flaccid and toneless animal. The nerve-fibres concerned are among the largest in the body and therefore the fastest conducting, and their threshold of stimulation is extremely low. They constitute *par excellence* a priority system for emergency use.

The role of the suppressor system in the natural economy of the intact animal may be understood only in relation to its opponent augmentor system. The augmentor system serves to increase the tonus of the extensor, standing muscles: it is Nature's response to the challenge of gravity. It enables the higher vertebrates to lift themselves off the ground by neuro-muscular effort with a greatly reduced expenditure of energy. The suppressor system is necessarily brought into being to enable the animal to face a gravitational emergency, that is an unsupported fall; the patterns of tonus needed for posture are inappropriate and must be replaced, at a moment's notice, by the righting-reflexes. When the suppressor system is put out of action by decerebration, leaving the augmentor system unopposed, muscular rigidity supervenes and the animal loses its fast-acting righting-reflexes, although keeping its slowly acting postural reflexes.

In an experimental animal, flaccidity is brought about by the application of a low-voltage electric shock to the suppressor system. The neurons of this system have no power of spontaneous activity, and in spite of their low threshold no instance has been recorded

of suppression or flaccidity suddenly appearing in the absence of stimulation. If an external source of neural energy is not forthcoming in the form of an electric shock, a natural equivalent to this artificial stimulus must be supplied from some powerful and instantaneously available source of inhibitory dynamic which has not yet been located, nor indeed even suspected.

The search must be narrowed down to the source of inhibitory dynamic. The polarity of augmentation and suppression, and their controlling gravitational reflexes, may therefore be discarded. Thus stripped of inessentials, the problem may be transferred to the dogfish, and further simplified by restatement in terms of kybernetics: what are the neuromechanical principles on which a dogfish works?

In its essentials, a dogfish may be regarded as an oscillatory mechanism in which the paraxial swimming-muscles alternately contract and relax to fashion the undulations of its body and tail which drive it through the water. On kybernetic grounds alone, this structural pattern demands an input of neural energy and a negative feed-back to keep it oscillating.

The principal sense-organ of the dogfish is its lateral line. This can be seen along the side of the body of almost every fish, running from the eyes to the tail. Structurally it consists of a narrow canal running the whole length of the body, bearing on its inner side a row of patches innervated by the lateral-line nerve, on its outer side a series of fine pores which place it in direct communication with its external environment. It serves as an organ of a special water-sense which has no counterpart in land-living creatures, and its functions have been made the subject of a great deal of speculation and experiment.

It was discovered by Hoagland (7) that the lateral-line nerve fed into the brain a continuous stream of impulses which was maintained independently of activity or rest. He found that "there are at least two groups of lateral-line receptors, one directly responsive to tactile and pressure stimuli and to compression from surrounding tissues, giving impulses only when so stimulated and showing rapid adaptation to a constant stimulus; the other continuously active, emitting impulses repetitively at frequencies determined by a continuous process in the receptors. These organs apparently mediate responses of the fish to temperature change in the water. . . . Discharges from the lateral-line receptors may perform a tonic reinforcing role in postural and swimming reflexes in addition to serving as pressure receptors." The massive continuous discharge was traced into the cerebellum, whose electrical activity was silenced by cutting both lateral-line nerves.

There are reasons for thinking that the unceasing input from the sensory patches of the lateral line furnishes a major source of neural dynamic, and enables the dogfish to keep up its perpetual-motion reflexes of swimming. On the other hand, the dogfish often lies motionless on the bottom of the sea, so often indeed that it has been given the name of ground-shark, and its ventral surface is flattened as a natural adaptation to this habit. During the whole of this time of quiescence the lateral-line organs are maintaining their ceaseless volleys into the central nervous system, but the expected output of perpetual motion does not appear. A powerful inhibitory influence must be at work—as powerful, indeed, in quantitative terms as the source of neural energy whose effects it has to neutralize. Everything points to this inhibitory centre being under the control of the sense of smell.

The huge olfactory lobes of the dogfish are housed at the anterior end of the cranium. They send their afferent nerve-tracts into every part of the fore-brain. The visual centres are the optic lobes on the roof of the mid-brain, corresponding to the human anterior corpora quadrigemina. The cells of the optic lobes are arranged in a complicated pattern of layers, and the mid-brain has most claim to be regarded as the dominant centre of the dogfish-mind. It receives tracts from all the other senses, and its efferent fibres have direct influence upon the spinal cord; electrical stimulation of points in the optic lobes produces various movements of the fins, suggesting a system of control similar to that exercised over spinal centres by the cerebral cortex of mammals through the pyramidal tract (16). The principal motor

centre of the dogfish is therefore in the mid-brain, under the sense of vision. The smell-brain (rhin-encephalon) being in the forward position may be expected to have a controlling or inhibitory influence upon the motor centres of the mid-brain.

This inhibitory influence is clearly demonstrated in the feeding habits. "The dogfish and nursehound are regular bottom feeders and swim just above the ground. Their olfactory pits or nostrils are on the under side of the snout, in an excellent position for detecting bottom animals.... If food is thrown into their tank they nose about over the gravel until they happen to swim over a piece, when they immediately stop, back if necessary, and pick it up" (15).

That the sense of smell is not only inhibitory, but instantly and effectively inhibitory, is proved by the observation "they immediately stop". There is no question here of a build-up of neural impulses, but rather the sudden release of an overpowering flood of impulses that have been stored, possibly in reverberating circuits, where they can be instantly available to oppose the incoming volleys from the lateral line.

The neuro-mechanical principles, therefore, of dogfish economy appear to be as follows. On the positive, augmentor side there is a constantly maintained influx of neural energy from the lateral line. The nervous impulses are received by nuclei at the upper end of the medulla and are relayed for amplification to the cerebellum. The amplified impulses are fed back into the main motor pathways, whose controlling headquarters are in the optic lobes of the mid-brain, corresponding anatomically to the human tectum, but in function equivalent to the motor cortex.

On the negative or suppressor side, the most outstanding feature in both dogfish and man is the instantaneity of the suppressor response: in the inhibition of swimming at the smell of food, the inhibition of posture to meet a fall. In both, and particularly in the case of the falling mammal, it is as though there were broadcast throughout the whole central nervous system an emergency alarm: "Stand by for total action, set all dials to zero." Traffic everywhere is brought to a standstill, and like the clang of a fire-engine the machinery of the righting-reflexes takes command and finds every neuro-muscular pathway cleared and awaiting its emergency orders.

It is obvious that dynamic or quantitative considerations must enter in at this point. A vastly complicated piece of machinery, holding thousands of millions of circulating permeability-waves which are its internal currency, cannot suddenly be switched over to a completely different pattern of response without a quantitatively equivalent amount of neural energy being brought out of its reserves. When the Queen of England presses a button and the whole of Her Royal Navy lights up in a flash to honour her gracious presence, it is not the few dynes of energy needed to move a finger, but the co-ordinated labour of ten thousand men that suddenly springs into life. The problem is to find the source of the dynamic which is so instantly available to the living organism in a time of physiological emergency.

The search (it must be emphasised) is for the dynamic of the suppressor response. This dynamic must be in the currency of neural energy in order that it can inhibit and re-direct neural energy. The comparatively leisurely flight-or-fight reaction of the archaic sympathetic system, potentiated on a chemical level by the release of adrenalin into a slowly moving blood-stream, is a thousandfold too sluggish for present requirements.

An essential condition that must be satisfied is the availability, at a fraction of a second's notice, of a source of energy that will meet on equal terms the momentum of the reverberating circuits that echo from cerebellum to muscle-spindles and back, stimulated and reinforced by the unceasing outflow from the lateral lines or the otoliths. A quantitatively equivalent amount of energy, similarly stored in reverberating circuits, alone will answer the purpose.

The structural pattern of plus and minus that appears in the dogfish is seen also in the brain of a frog. The whole of the cerebral hemisphere is devoted to the sense of smell, for fibres from the olfactory tract penetrate to almost its every part. "Some indication of the function of the cerebral hemispheres is given by the fact that by placing electrodes

connected with a suitable amplifier upon them, rhythmical changes of potential can be recorded. These are most marked in the olfactory bulb and probably propagate backwards along the hemisphere. The rhythms continue even in a brain that has been removed from the head. They are therefore a sign of some intrinsic activity of the brain, rather than of response to a peripheral stimulation" (16). The spontaneous rhythm of the isolated toad-brain has a frequency of 4 to 5 cycles a second, and an electrical amplitude of 10 to 50 microvolts, which can on occasion rise to 100 microvolts (3).

Now there is no reason to suppose that the frog is unduly dependent upon its sense of smell; indeed, the opposite seems to be the case. Studies of the feeding-habits of its near relative the toad (admittedly a less discriminating feeder than the frog) suggest that smell plays no part whatever, and that control of feeding is exclusively the prerogative of vision. "The food of the toad, wrote Newman in 1869, seems to consist of all living animals that are susceptible of being swallowed. It is a sweeping statement; nevertheless, with a few exceptions, it is true . . . certain beetles and caterpillars are refused, but apart from these the toad has no food preferences. It takes whatever comes its way. . . . Only prey that is moving is taken. Passing insects may be snapped up suddenly; but usually all food is studied intently for some moments before being caught" (12).

Removal of the cerebral hemispheres in the frog is said to have very little influence on the normal patterns of feeding. Electrical stimulation of the fore-brain is unproductive of movements; stimulation of the optic lobes of the mid-brain, however, causes movements of the limbs and body (16). As with the dogfish, the mid-brain is evidently the dominant centre and corresponds functionally to the motor cortex of the human.

One is met with the paradox, therefore, that in frogs and toads that part of the brain which anatomically is the most largely developed and physiologically the most electrically active appears to play no part in any of the natural functions of the animal, and indeed seems to serve no discoverably useful purpose whatever. Having in mind the dominant role of the smell-brain in the life of the dogfish, and also the extremely penetrating and far-reaching extent of the nervous connexions from the olfactory lobes to every part of the cerebral hemispheres of the amphibian, it is exactly as though an important government department had evacuated, leaving the whole of its administrative machinery not only intact and in working order, but (as recorded electrically) actually working—yet without a soul on the premises to administer.

The problem of the untenanted rhinencephalon becomes a thousandfold more insistent, more insoluble, when translated to the cortex of the human brain. An authoritative review of the olfactory brain was unable to reach any conclusion as to the primary function of its chief member, the hippocampus. "The hippocampus of mammals and man may have some *indirect* relation to smell. But clearly its main function must be sought for in other spheres, and the question arises whether any information is available on this point. . . . The assumption that the cingular gyrus, and consequently then also the hippocampus, are related to autonomic functions appears at least more reasonable than to associate this system mainly with olfactory functions. It appears at present not possible to approach the functions of the hippocampus more closely than this" (2). There has been no factual advance from this position during the last ten years.

The olfactory machinery of the dogfish, its living yet useless replica in the frog, has been inherited by man undiminished in complexity. It constitutes in him the most far-reaching and ramifying system of nervous interconnexions in the whole of the animal kingdom. For those deeper parts of the cortex which, anatomically, must be regarded as olfactory are not only absolutely larger in the human brain than in any other primate species—that could be accounted for by their sharing in the general enlargement of all intracranial tissues—they are larger relatively (2). In no other simian or anthropoid stock does the rhinencephalon occupy so great a proportion of the volume of the skull, or make bigger encroachments upon the rigidly limited cranial capacity—inevitably at the

expense of other and more active departments of the brain whose emerging functions, it might well be thought, would entitle them to priority.

It is possible, moreover, that the anterior end of the neural axis, the place *par excellence* of honour and over-all control, has come to be for a palæontological while under the control of the sense of smell merely, as it were, by an evolutionary accident. The earliest "nose" connected with a centralized nervous system is the organ of Kölliker in the embryo amphi-oxus or lancelet, which, as its names imply (*oxus* sharp, *amphi* both), is lanced at both ends and has no head. Kölliker's organ is a minute depression or pit near the front end of the lancelet, lined with special cells which are believed to be sensitive to chemical stimuli. It occupies the depression formed at the anterior neuropore by the final closure of the neural canal from which have arisen all the higher vertebrate nervous systems.

For the lancelet living blindly in the sand, life is little more than a universe of smell, and the primary function of the chemoreceptor at its anterior end is to give warning of changes in its chemical environment, leading to escape from unhealthy water-conditions (16). With the acquisition by vertebrates of the senses of sound and sight, there commenced a morphological battle that has raged for the past three hundred million years for the functional control of the frontal end of the cerebral axis, and the eviction of the archaic chemical sense from the place of honour and from its exercise of the power of veto that goes therewith.[1] The present chaos in the human cortex is the *ad hoc* result of that agelong conflict.

It is suggested therefore that the purpose of the human rhinencephalon is to act as an inhibitory mechanism, by housing in its bulk an immense reserve of neural energy in the form of circulating permeability-waves, instantly available for release in an emergency to counter, in the proper currency of the nervous system, the reverberating circuits that maintain the postural tonus of the muscles.

Supporting this argument first on the teleological ground of necessity, it' is essential to hypothesise a mechanism of this nature (of neural impulses in the form of permeability-waves), of this degree of instant availability (already in circulation and needing therefore no latent period for a build-up), and of a quantitative intensity sufficient to counter the volume of impulses reverberating between the cerebellum and the postural muscles. Using also the argument of elimination, there is no region or system of the brain having the necessary qualifications, other than the rhinencephalon; for the functions and anatomical connexions of all the other masses of grey matter are known sufficiently well, in gross if not in detail, to preclude their employment as the dynamic of inhibition.

Certain narrow strips in the cortex, it is true, have been credited with the power of instant suppression on receipt of an artificial (external) stimulus. These suppressor zones may be the cortical foci of *origin* of inhibition, but not the fount of its *dynamic*: there is a difference between a master-switch and a dynamo.

The headquarters of the olfactory brain is the hippocampus. The uniform simplicity of the hippocampus (one of the largest cytotectonic areas of the human cortex and the most constantly patterned from mouse to man, (8)) and the concentration of its outflow into a single channel, the fornix, have already suggested to some anatomists that this area of the brain must have a unitary and non-specific function, being eminently suited to a concentrated and synchronized discharge.

The purpose of this concentrated and synchronous discharge is still a complete mystery. "Having established the fact that the hippocampus is not solely concerned with olfaction, we are confronted with the problem of what else it does. At the present time all that can be said on this point is that animals in which the hippocampus has been interrupted show no obvious behavioural deficits except possibly for greater placidity" (4). It does not seem to have occurred to anyone to drop these animals from a height—probably they

[1] The morphological traces of this conflict have been reviewed (from a somewhat different angle) by Herrick, C. J.: The origin of the cerebral hemispheres. *J. Comp. Neurol., 32:* 429–454, 1921; The functions of the olfactory parts of the cerebral cortex. *Proc. Nat. Acad. Sc. 19:* 7–14, 1933.

are scientifically too precious for rough handling. An urgent situation of this kind, demanding instant mobilisation of a total response, might well reveal a deficit of behaviour that the slow postural changes have failed to evoke.

The righting-reflexes of a falling cat have been used as the most dramatic example of total inhibition of all postural tonus and voluntary movement in the face of a gravitational emergency. The same inhibitory mechanism, however, is brought more gently into play whenever postural tonus is replaced by voluntary movement itself. Every movement of the trunk and limbs must be conceived as starting from a posture and ending in a posture. Postural tonus is maintained as an integration of the stretch-reflexes of the individual muscles; it is potentiated by the constant outflow from the otoliths and the reverberating circuits echoing between the cerebellum and the muscle spindles.

Posture must therefore be conceived as a dynamic process, namely the maintenance of postural equilibrium by means of circulating quanta of neural energy. Voluntary movement demands the temporary disturbance of that automatic equilibrium. The first phase of this disturbing process is the instantaneous inhibition of the postural circuits through the muscles it is proposed to move,[2] and the last phase is the restoration of that equilibrium when the conscious part of the mind has ceased to concern itself with the muscles whose tonus it has disturbed.

It is an essential part of the present theory that the reverberating circuits which are responsible for the maintenance of postural tonus can be inhibited only by reverberating circuits having dynamical properties similar to those of the circuits they seek to inhibit. It is furthermore suggested that this inhibitory dynamic is maintained in instant readiness within the rhinencephalon, the circularity of whose pathways was described by Papez (11), and that this indeed is the principal function of the rhinencephalon in the terrestrial vertebrates.

The alpha rhythm is cited as objective evidence of this theory. On mechanical grounds it has been found necessary to postulate a hitherto unsuspected source of neural dynamic which is able to effect the suppression of the alpha rhythm, a suppression which is both instantaneous and sustained (13). The neural dynamic which inhibits the alpha rhythm (it is believed) is none other than the reverberating circuits of posture, which are themselves abolished by their task of inhibition.

* * * * *

The most striking confirmation of this theory is in a paper by Green and Arduini (6) which appeared after the foregoing article was drafted. These authors have found (in the rabbit, cat and monkey) that the rhythmic action of the hippocampus appears and disappears inversely with that of the neocortex. "Arousal or desynchronization of the neocortical record . . . is invariably associated with the concomitant appearance of an undulating series of large slow waves in the hippocampal record . . . . The hippocampus apparently responds equally well to afferent stimuli in the absence of the neocortex. This indicates that, whatever its function may be, its electrical activity is not a passive reflection of cortical rhythms . . . . This wave response is a relatively stereotyped concomitant in the hippocampus of the arousal or alerting reaction in the neocortex . . . . Any afferent stimulus leading to desynchronization of the electro-encephalogram invariably induces a concurrent sequence of undulating waves in the hippocampal record of rabbits and cats. Such strikingly inverse patterns of activity are also evoked simultaneously in these two parts of the forebrain by direct exitation of the arousal mechanism in the brain stem described by Moruzzi and Magoun (10). Records of spontaneous electrical activity in the neocortex and hippocampus furthermore exhibit frequent inverse correlations as the animal shifts between wakefulness and sleep, the records from the hippocampus being synchronous when that from the neocortex is desynchronized and vice versa . . . . The data reported here thus provide abundant documentation for inverse relations between neocortical and hippocampal activity."

[2] "The activity of the cortico-spinal tract seems essentially to be non-postural. When the stimulus is stopped the reaction fails, and that with great suddenness. . . . The non-postural cerebral activity seems to abolish the postural mid-brain activity and thus to leave, perhaps, a virgin field for any subsequent reaction." Brown, T. Graham: On postural and non-postural activities of the mid-brain. *Proc. Roy. Soc., 87B:* 162–163, 1919.

Should these results be confirmed in man, it would be reasonable to say that the alpha rhythm of cerebral repose is diverted to the hippocampus. This would be an entirely satisfactory answer to the objections that have been raised on purely mechanical grounds against the unexplained "disappearance" of the alpha rhythm (13).

Furthermore, a synthesis is now in view of the Papez theory of the emotional role of the hippocampus (11) with another theory, that of Brock and Wechsler (1), which was put forward to account for the emotional apathy of Parkinson's disease. "Movements of emotional expression are notably lacking in paralysis agitans. We believe that, with man's assumption of the upright posture and his evolved capacity to give motor facial expression to his emotions, the facial mimetic motor patterns became fused with the righting reflexes. In man the righting reflexes have acquired an affective component."

There is no doubt of the intensity of the affective component of the righting-reflexes, an intensity which gives them priority even over severe pain. If a loss of balance is checked by an outstretched arm resting on a hot surface, flexion of the elbow (to withdraw the hand in pain) is totally inhibited until gravitational stability has been restored. The emotional concomitant of such a situation is terror.

If then the rhinencephalon is concerned both with the righting-reflexes (as the fount of instantaneous suppression) and with their affective component of terror, removal of the hippocampus or section of the fornix would abolish terror in this and possibly other situations, leaving an animal that was more than usually placid. Several observations have indicated that this indeed is the case.

Although many experiments have been made in an attempt to discover the specific function of the hippocampus, there is no record of any tests involving the righting-reflexes, or the response to a sudden loss of support. If there is any substance in the theory put forward in this paper, a gravitational stimulus should be more powerful than any other in bringing about the alerting reaction both of neocortex and hippocampus, with cessation of the cortical rhythm and its diversion into the neural pathways of the rhinencephalon.

Summary

Static posture in maintained by reverberating circuits, which must be instantly suppressed to make way for the righting-reflexes. This suppression demands an equivalent quantum of neural energy which is instantly available, and therefore must be stored in the form of reverberating circuits. The suppressor system is the pathway, and the cortical suppressor strips are the controlling centres for this action; but neither possesses the power of spontaneous discharge apart from electrical stimulation, neither can supply the dynamic of instantaneous suppression.

The augmentor system is Nature's response to the challenge of gravity. The opponent suppressor system is necessary to enable the animal to face a gravitational emergency, that is a fall. The source of suppression is postulated as residing within the rhinencephalon.

Consideration of the comparative physiology of amphioxus, dogfish, amphibian and human support the view that the rhinencephalon has always non-olfactory, inhibitory properties. It is suggested that the purpose of the human rhinencephalon is to act as an inhibitory mechanism, by housing in its bulk an immense reserve of neural energy in the form of circulating permeability-waves, instantly available for release in an emergency to counter, in the proper currency of the nervous system, the reverberating circuits that maintain the postural tonus of the muscles. Changes in the alpha rhythm are cited as objective evidence in support of this theory.

BIBLIOGRAPHY

1. Brock, S., and Wechsler, I. S.: *Arch. Neurol. Psychiat., 17:* 15, 1927.
2. Brodal, A.: The hippocampus and the sense of smell. *Brain, 70:* 179–222, 1947.
3. Ebe, M.: Potential changes in the isolated toad brain. *J. Expt. Med., 56:* 3, 1952.
4. Fulton, J. F.: *Frontal Lobotomy and Affective Behaviour.* New York: W. W. Norton, 1951, p. 72.
5. Gerard, R., and Young, J. Z.: Electrical activity of the central nervous system of the frog. *Proc. Roy. Soc., 122B:* 343–352, 1937.
6. Green, J. D., and Arduini, A. A.: Hippocampal electrical activity in arousal. *J. Neurophysiol., 17:* 533–537, 1954.
7. Hoagland, H.: *Pacemakers in Relation to Aspects of Behaviour.* 1935 p. 70.
8. Lorente de Nó; R.: *J. Psychol. Neurol., 46:* 113–177, 1934.
9. Magoun, H. W., and Rhines R.: An inhibitory

mechanism in the bulbar reticular formation. *J. Neurophysiol., 9:* 165–171, 1946.
10. Moruzzi, G., and Magoun, H. W.: Brain stem reticular formation and activation of the EEG. *EEG Clin. Neurophysiol., 1:* 455–473, 1949.
11. Papez, J. W.: A proposed mechanism of emotion. *Arch. Neurol., 38:* 725–743, 1937.
12. Smith, Malcolm: *The British Amphibians and Reptiles.* London: Collins (New Naturalist Series), 1951, pp. 96, 97.
13. Stanley-Jones, D.: Reverberating Circuits. J. Nerv. Ment. Dis. 1957.
14. Welsh, J. H.: Diurnal rhythms. *Quart. Rev. Biol., 13:* 124, 1938.
15. Wilson, D. P.: *Life of the Shore and Shallow Sea.* London: Nicholson and Watson, 1937, p. 88.
16. Young, J. Z.: *The Life of Vertebrates.* Oxford: Oxford University Press, 1950.

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NORMALITY, NEUROSIS AND PSYCHOSIS

Some Observations on the Concepts of Mental Health and Mental Illness

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The words "normal", "neurotic" and "psychotic" are in everyday use in medicine, psychiatry and psychoanalysis. They, and the concepts that they denote, have been handed down to us from pre-Freudian days. Freud adopted them and used them in all of his psychological writings. In recent years some psychiatrists have questioned the value of these concepts (1, 3). But these complaints, like those about the weather, have been unaccompanied by remedial action. At times, it has been advocated that the concept of "normal-abnormal" be dropped from psychiatric usage, but this suggestion has gained little support. Obviously, the concepts of mental health and illness are useful and even necessary in various ways and cannot simply be dropped from our technical vocabulary. It seems to us, however, that practically useful efforts to improve the use of these concepts can best be undertaken only after an examination of their origin and function. We propose to undertake such an examination in this essay.

In addition, we shall attempt to define the multiple meanings of "normal", "neurotic" and "psychotic", according to the particular social situations and theoretical frames of reference in which they are used.

Bodily Illness as the Model of Mental Illness

Historically, the concept of "mental illness" is a successor to the notion of being a sinner or being possessed by demons (witchcraft). So-called scientific medicine has developed *pari passu* with the abandonment of the moral-demonological viewpoint. Probably for this reason, the medical profession, and psychiatrists in particular, is prone to claim that all manner of "human problems" are "diseases". It is as though it would be feared that if we did not espouse this view, for example, by not insisting that "neurosis" is an "illness", we would be driven back to condemning such behavior as "sinful". But surely there is no reason that compels us to accept either one or the other of these views. There may be, and indeed there must be, other approaches to problems of human relationships that are more serviceable than the frame of reference of either traditional medicine or traditional morality.

The development of modern medicine—whatever its practice may have been in ancient times—has consisted of the study and treatment of bodily disorders. Thus, the body is the primary object of interest for the physician. Behavioral events, like matters of sanitation, public health or the influence of religious or legal rules on health, have become of medical interest only gradually, and some only recently. It is not surprising, therefore, that the traditional frame of reference of medicine has been applied to each of these areas as they have become incorporated, so to speak, into the domain of medicine. Thus, the concepts of normal and abnormal were borrowed from medicine and were applied to psychiatry, that is, to behavior and its alleged organ, the "mind". In this way we arrive at the concepts of normal and abnormal behavior, and the normal or abnormal mind.

That this mode of classifying human behavior has some advantages is evident from the very popularity of these concepts in both scientific and lay circles. Still, its disadvantages are many. Only nowadays, however, has psychiatry advanced far enough to make the complications felt that have resulted from the adoption of a theoretical framework which does not fit its data.

Szasz (19) discussed this problem in a recent essay dealing with the relationship of psychiatry and law. He stated:

"In organic medicine, we have certain criteria by which many people of widely varying backgrounds and beliefs can agree on what constitutes health and disease. This follows from the fact that the function of the body as

a machine is given in large measure by the way its parts are put together and work. Accordingly, anything which interferes with life (i.e., growth, reproduction, etc.) is regarded as 'unhealthy'; and, contrarily, the state in which there is no interference with the workings of the bodily machinery is called 'health'. The crux of the matter lies in the *general agreement* that the 'body is for living', so to speak. It is relevant to note that under certain cultural conditions there may be a disagreement as to this definition of health, and then we see an attitude toward organic illness at variance with our present point of view."

This issue of *consensus* is crucial to our thesis. In organic medicine, dealing with the body as a machine—and in particular at the level at which scientific progress occurs in this field—agreement on which modes of functioning are favorable, and which unfavorable, for life is rarely a problem. A fractured humerus, jaundiced skin, inability to metabolize glucose or a carcinomatous growth can all be usefully subsumed under the concept of abnormal. Behavioral events must be viewed in their historical and social context and do not lend themselves to a comparable classification unless a certain violence is first inflicted on the observational material, a recourse that is taken not infrequently in this dilemma (18).

It is also important to note that in the framework of medicine the terms "normal" and "abnormal" are relatively devoid of moral judgment. Thus, although to have lobar pneumonia is abnormal, it is not immoral and does not result in any damage to the patient's social status. To call a person "mentally abnormal", however, is to pass moral judgment on him. It is a form of castigation and often results in social injury. To deny this facet of the phenomenon is to falsify our observational data.

Reider (15) called attention to this aspect of the problem of normality. He noted that normality is for many people a ". . . new morality (that) has complicated our nosology and psychodynamics. . . ." "In many, it is a thin layer which disappears quickly in the course of the initial communication between patient and therapist. 'Is that normal?' is soon recognized as meaning 'Did I do right or wrong?' " Reider discussed this and presented clinical examples of the ways in which normality has becomes a cultural value. He did not state explicitly, but we would add that in this sense the terms and concepts of "mental health" and "mental illness" are simply new words replacing the older ones of "virtue" and "sin". In other words, a cultural value, such as thrift, at one time was regarded as a virtue. Another, like homosexuality, was regarded as a sin. In the current (psychiatric) vernacular, thrift and homosexuality would be subsumed under the categories of normality and mental symptoms, respectively.

Analysis of the Concepts of Normality, Neurosis and Psychosis

On the basis of the considerations that have been presented thus far, together with the everyday experiences that arise in the practice of psychiatry and psychoanalysis, we have come to the conclusion that the concepts normality, neurosis and psychosis are used, in actual fact, in several diverse contexts and frames of reference. A condensed presentation of the various frames of reference and the meanings of normality, neurotic and psychotic pertinent to each is given in table 1. Some comments on this attempt to classify the meaning and relevance of these terms will now be made.

It should be noted that although the notion of a frame of reference may be alien to physicians and psychiatrists, it—like philosophy—is something that all scientists use, knowingly or otherwise. The first category in which these concepts fit is that of medicine. In this context, normal means "healthy", neurotic signifies "slightly or moderately ill" and psychotic stands for "very ill". The next category, that of psychopathology, is fashioned after the model of medicine, and the two may well be discussed together. Here, as noted, the lack of symptoms, or the notion of "good adaptation", is equivalent to normality. Hysterical, phobic and obsessive-compulsive symptoms are called "neurotic", and delusions and hallucinations "psychotic". Psychoanalysis introduced the auxiliary idea of a so-called break with reality, so that the normal person may be thought of as being in full contact with reality, the neurotic broken with it a little, and the psychotic broken a great deal. It is clear that a comparison with the perceptions or ideas of a presumably

TABLE 1.—Analysis of the Concepts of Normality, Neurosis and Psychosis

Frame of Reference	Normality	Neurosis	Psychosis
I. Medicine			
A. Disease	Healthy.	Mildly or moderately ill.	Very ill.
B. Psychopathology	The absence of "symptoms".	Manifesting "neurotic" (e.g., hysterical, phobic, etc.) symptoms; slight to moderate regression and break with reality.	Manifesting "psychotic" (e.g., delusions, hallucinations, etc.) symptoms; severe regression and break with reality.
C. Treatment	None in order.	Considered indicated but not mandatory. "Prognosis" is good.	Considered imperative. "Prognosis" is poor.
II. Social action	No action in order.	Slight to moderate action in order. Patient is considered "eccentric" or peculiar and is depreciated; or, he is regarded fondly as "unusual", "talented" or "artistic".	Severe repressive action is considered justified because the patient is thought to be dangerous to himself and others (e.g., commitment). He is viewed with awe, pity and fear.
III. Moral judgment	"Good" or virtuous behavior	Moderately "bad" or sinful behavior	Very "bad" or sinful behavior.

"normal" observer is implicit in this scheme. Full agreement between observer and patient is considered normal, partial agreement neurotic, and serious disagreement psychotic (17). The chief value of both of these frames of reference seems to be that they furnish a means for those studying the phenomena in question to classify their observations in an orderly scheme. It also permits clear communication among those of like experience, that is, among the observers (psychiatrists). These are the facts that are probably chiefly responsible for the persistence of these classificatory schemes. The shortcomings inherent in this approach were mentioned earlier, have been discussed elsewhere (17) and need not be repeated here.

From the point of view of treatment—i.e., a social action based on the skills and status of physicians—normal means that no treatment is in order. The diagnosis of neurosis signifies that treatment is "indicated" to correct the neurosis but that it is not mandatory. Associated with this notion is also the idea that treatment is not very difficult to carry out and that the "prognosis" is good. In the case of psychosis, the term signifies that treatment is mandatory and most difficult and that the outlook is "guarded". It is obvious that these notions are at great variance with what psychoanalysts believe and practice in their daily work. Here again we deliberately omit a detailed exposition of how these concepts, interpreted in one frame of reference, do not fit the ideas and work carried out in another. We do this principally because we do not want to create the impression that we are opposed to one of these viewpoints and champion another. We also believe that making each framework explicit will enable the reader to make comparisons for himself and to draw his own conclusions from them.

The fourth category, that of social action, is similar to the frame of reference of medicine, except that it is more inclusive. It thus encompasses the entire social system in which the patient lives. In addition to psychiatrist and physician, therefore, the patient's family, employer, lawyers and others are involved in whether or not and, if so, what kind of social action might be taken vis-a-vis the patient. In this context, normal again means that no social action is in order. Neurotic suggests that only minimal measures of censure are demanded. For example, the patient is viewed as eccentric or peculiar, and he may be "treated" by being ostracized or otherwise socially depreciated; or he might be viewed as "gifted" and "artistic" and on these terms permitted the "neuroticism" that tends to be denied to others. Finally, the term "psychotic" in the framework of social action, means that

serious repressive measures against the patient are usually considered legitimate. He is regarded as a "danger" to himself and to others. He inspires mystery, awe and fear in those about him.

Lastly, we have the framework of moral judgment. Here normal means "good", neurotic "slightly (or moderately) bad", and psychotic "very bad". Normal (in this sense) was discussed by Reider (15) in the essay previously mentioned. It is a corollary of his thesis that if normal means "good", neurotic and psychotic respectively mean moderately and very "bad".

The value or limitation of each of these conceptual frames of reference is to be judged on the basis of the particular problem at hand. The requirements, in this respect, of say scientific research, on the one hand, and of legal action, on the other, are quite different. Thus, as it has been frequently stated, the labeling of one mode of behavior as normal and another as abnormal does not encourage psychological understanding of human problems. It may be of great value, however, in determining whether or not social action should be taken in connection with a specific episode of anti-social action (16, 19). Although this may be a disappointment to those who hope to find some transcendental character in the notions of mental health and illness, it ought not surprise us when viewed in the light of the development of scientific concepts in other disciplines. Thus in modern physics—which is, after all, our paradigm of an effective and rapidly advancing science—concepts of a general scope and validity have gradually given rise to others whose meanings are circumscribed and limited by the situations in which they occur and by the operations of which they partake ("operationalism"). Our analysis of the concepts of normality, neurosis and psychosis is offered as an attempt at such an operational clarification of these concepts.

The Changing Meaning of "Normal" and "Abnormal" in Psychoanalysis

The relativistic character of "normal" and "abnormal" is proclaimed often but implemented rarely, at least in psychiatry. The cultural anthropologist has been more consistent in the advocacy of this principle. His ability to do so stems, probably in large part, from the fact that he does not need to concern himself with therapy. The issue of treatment immediately plunges the psychiatrist into the problem of having to change his patient from a state A, that is "bad" (neurosis), to a state B, which is "good" (normality) or at least better than A.

The marriage bond, however metaphorical, between psychoanalytic treatment and psychoanalytic theory is a very firm one. Accordingly, it is particularly interesting and instructive to examine how even in the brief history of psychoanalysis the meanings of the concepts of normal and abnormal have changed. Three fairly distinct stages in this development can be distinguished although the transition from one to another was not always a sharp one. Thus, in addition to the categories to be described, there occurred, in actual practice, situations in which concepts belonging to two or more different frames of thought were combined or mixed.

In the earliest years of psychoanalysis, conversion hysteria was the model of mental disease. This disorder was considered to be characterized by certain typical *symptoms*, which were motor or sensory. There were constant attempts to link other disorders, not so characterized, to conversion hysteria. The hysterical symptom was thus the paradigm of "mental illness" (or mental abnormality). The corresponding concept of "cure" (and of normality) was the absence of such symptoms.

For reasons which are now well known, this conceptual framework was abandoned. An entirely new concept arose which, in its broadest theoretical import, has probably not received the attention that it deserves. An analogy may be drawn in physics to the development of the concept of radioactivity, that is, the idea that matter may spontaneously emit radiant energy. The new concept in psychoanalysis was the notion that mental illness is a disorder of "character". The word "character", taken from everyday language, was thus given a novel technical meaning. What was meant by "character disorder" was that a person's entire psychological functioning was somehow affected by "disease". This was manifest in his relationship to other people and could be observed with particular clarity

in the analytical situation in his relationship to the analyst. The "fact" of the presence or absence of symptoms is not negated by this view. Instead, symptoms have become relegated to the domain of the unimportant. In this context, then, mental disease means "disorder of character". "Neurosis" is a relatively minor disorder of character, whereas "psychosis" is one of serious and far-reaching proportions. Implicit in this scheme is the notion of a relatively "normal character". Finally, the notion of cure that corresponds to this concept of disease is "character change".

The third, or present, phase in the development of the psychoanalytic meaning of mental health and illness can be briefly stated as follows: The patient's disorder is conceptualized neither in terms of "hysterical symptoms" nor of "disorders of character". It is viewed, rather, as a problem in the relationship among "psychic structures" (id, ego, superego or endopsychic structures) (4). The analyst's estimate of the relative development and strength of the various intrapsychic structures and their relationship to one another is the principal guide to "illness" and "health". In other words, the essence of the matter here lies in the realm of abstractions formed by the analyst on the basis of his observations in the analytic situation. It is an inference from the analytic situation and from *nowhere else*. It is, therefore, not like an inference based on a hysterical symptom, an observation which can be made by anyone who has the most cursory contact with the patient. We thus arrive at a concept of mental health and illness that is the most rigorously operational of the three listed. At the same time, its relevance is limited to the situation in which such observations can be made (the analytic situation). The concept of cure that corresponds to this level of abstraction is that known as "structural change". This expression, too, refers to a higher level abstraction formed by the analyst, and by the analyst *only*, on the basis of his specific observations.

These considerations highlight the changing character of psychoanalysis, both as a therapeutic technique and as a theory. They also illustrate what is of relevance for our present thesis, namely, the ways in which the notions of what constitutes "mentally normal and abnormal" have changed (see table 2).

TABLE 2.—THE CHANGING CONCEPTS OF MENTAL DISEASE ("ABNORMAL") AND CURE ("NORMAL") IN PSYCHOANALYSIS

Mental Disease ("Abnormal")	Characteristic Feature and Illustrative Example	Cure ("Normal")
I. Symptom	Disordered bodily function without physical lesion. Conversion hysteria.	Absence of symptom.
II. Character disorder	Disordered behavior manifested by repetitive patterns in human relationships. Fate neurosis.	Character change.
III. Un-named at present (an abstraction which the analyst reaches from observations about the patient's behavior in the analytic situation).	Specific, individual features of the transference and the patient's defenses against it. Can be illustrated only by excerpts from case material.	Structural change.

COMMENTS ON THE PERTINENT PSYCHIATRIC LITERATURE

The terms "normal", "abnormal", "neurotic" and "psychotic" occur in practically every psychiatric and psychoanalytic paper. Often they are used as though they were well defined and accepted by general agreement. Attention to the problem, as we have outlined it, will show, however, that the opposite is the case. We do not propose to document this sweeping assertion by refering to the literature because the evidence is readily available and banal. (It should suffice to note that most often authors use the word "normal" to refer to whatever they are *not* discussing. For example, in a paper on schizophrenia, "normal" usually means "not schizophrenic".)

In the psychiatric literature, articles by Bowman and Rose (1) and Diethelm (3) merit special emphasis. These articles are exceptional in their cogent criticism of the terms and concepts of neurosis and psychosis, and by

inference of the concept of normality, as well. These authors pointed out many of the ways in which these concepts are defective and misleading without, however, offering suggestions for improvement. Indeed, in their other writings, these authors, like most others, have found it impossible to dispense with the traditional nosological conventions. Using the framework of situations of illness and the patient's reaction to it, Brolley and Hollender (2) have recently pinpointed the difficulties to which the concepts of normal and abnormal may lead. "Concepts of normality, stability or flexibility have relatively little meaning when we consider the adjustment or adaptation to an illness. People with intense longings to have others care for them may tolerate an invalided state with few emotional repercussions. They often respond poorly, however, to efforts at rehabilitation. Conversely, persons who struggle against having others take care of them will react poorly when they are incapacitated. They are more apt to respond favorably, however, to a program of rehabilitation. The meaninglessness of a concept of normality in relationship to physical limitations can be brought out most clearly by an analogy. A hermit-like man marooned on a desert island will endure his isolation with more equanimity than a gregarious man. Obviously this has nothing to do with normality, stability or flexibility."

Only a few psychoanalytic articles have dealt explicitly with the problem of mental normality (10, 12, 13). These, for the most part, have tended to propose various criteria on which normality and abnormality might be based. They have not examined the theoretical framework of the concepts and their implications, which is the subject of our interest in this essay. Fenichel's (5) comments succinctly summarize the psychoanalytic position that has been taken on this problem:

"The difficulties of exactly defining 'normality' and 'health' from a psychoanalytic point of view have frequently been discussed (he lists references to N. Cantor, E. Glover, E. Jones (13), M. Levine, L. A. M. Maeder, T. Schroeder), especially recently in a very impressive way by Hartmann (12). Fortunately, practice requires less exactness" (p. 581).

In our further discussion of the psychoanalytic literature on this subject, we shall limit ourselves to citing a few passages from Freud's writings and offering some comments on them. In this way we hope to illustrate, first, the manner in which the concepts of mental normality and abnormality have been used by Freud—and subsequently by contemporary psychiatrists generally—and, secondly, our thesis regarding the restrictions that must be imposed upon this usage if these concepts are to retain the value originally inherent in them.

In "A General Introduction to Psychoanalysis" (1915–1917), Freud (7) wrote: "In the ordinary way it is apparent that by flight into neurosis the ego gains a certain internal 'advantage through illness', as we call it; under certain conditions a tangible external advantage, more or less valuable in reality, may be combined with this. To take the commonest case of this kind: a woman who is brutally treated and mercilessly exploited by her husband fairly regularly takes refuge in a neurosis, if her disposition admits of it. This will happen if she is too cowardly or too conventional to console herself secretly with another man, if she is not strong enough to defy all external reasons against it and separate herself from her husband, if she has no prospect of being able to maintain herself or of finding a better husband, and last of all, if she is still strongly attached sexually to this brutal man. Her illness becomes her weapon in the struggle against him, one that she can use for her protection, or misuse for purposes of revenge. She can complain of her illness, though she probably dare not complain of her marriage; her doctor is her ally; the husband who is otherwise so ruthless is required to spare her, to spend money on her, to grant her absence from home and thus some freedom from marital oppression" (p. 333).

In connection with the use of the concept of "neurosis" in this context, we wish to pose the following questions and suggest some pertinent answers. Why is the wife called "neurotic" and not the husband? (Because the husband has more social power and because the example is taken from a social situation in which women, like children, are essentially disenfranchised.) Why is "neurosis" considered an

illness? (Because the patient's complaints are referred to her body and this makes it legitimate for her to consult a physician.)

The implication of this mode of operation, however, is that the physician lends himself and his professional prestige, and the social power inherent in it, to the perpetuation—and by inference, approval—of the existing social order. Some might object that in the more equalitarian American culture a psychiatrist consulted for a problem such as Freud sketched would diagnose the husband as "neurotic", too. Indeed, this would correspond to current practice and is consistent with the fact that social action, consisting of psychotherapy, would be recommended for both. Once again, this shows how closely the psychiatrist (or psychoanalyst) reflects the cultural values of his social environment (20). On the current American social scene, the pertinent cultural values are "freedom" and self-determination for both parties. Thus analytic influence may be itted against the "excessive" power of one marriage partner over another. No criticism of this practice (assuming that our analysis of this matter is correct) is intended. Our criticism is limited to emphasizing that an understanding of the action-patterns involved tends to be obscured and vitiated by the medical connotations of the concepts of "neurosis" and "mental illness".

We have asserted that in the case cited, Freud labeled the wife neurotic because he considered the social structure, as he found it, as satisfactory ("normal", "good"). In "Civilization and Its Discontents" (8), he makes this assumption explicit: "If the evolution of civilization has such a far-reaching similarity with the development of an individual, and if the same methods are employed in both, would not the diagnosis be justified that many systems of civilization—or epochs of it—possibly even the whole of humanity—have become 'neurotic' under the pressure of the civilizing trends? To analytic dissection of these neuroses therapeutic recommendations might follow which could claim a great practical interest. I would not say that such an attempt to apply psychoanalysis to civilized society would be fanciful or doomed to fruitlessness. But it behooves us to be very careful, not to forget that after all we are dealing only with analogies, and that it is dangerous, not only with men but also with concepts, to drag them out of the region where they originated and have matured. The diagnosis of collective neuroses, moreover, will be confronted by a special difficulty. In the neurosis of an individual we can use as a starting-point the contrast presented to us between the patient and his environment which we assume to be 'normal'. No such background as this would be available for any society similarly affected; it would have to be supplied in some other way. And with regard to any therapeutic application of our knowledge, what would be the use of the most acute analysis of social neuroses, since no one possesses power to compel the community to adopt the therapy? In spite of all these difficulties, we may expect that one day someone will venture upon this research into the pathology of civilized communities" (pp. 141–142).

This passage illustrates two other points which we also wished to emphasize. First, that "neurosis" is often used as a moral judgment and, second, that the matter of social action ("therapy") is intimately connected with the meaning of "neurosis". For Freud wondered what good it would be to label a society "neurotic", if one could not *compel* (sic) the "patient" to heed the recommendations made for "therapy".

Another relevant passage may be found in "The Future of an Illusion" (9). Toward the end of this essay Freud discussed religion as an "illusion" and stated: "In this connection the idea forces itself upon him that religion is comparable to a childhood neurosis, and he is optimistic enough to assume that mankind will overcome this neurotic phase, just as so many children grow out of their similar neuroses" (p. 92).

An important concept of what constitutes a "childhood neurosis" is inherent in Freud's consideration of this topic. For he makes it clear that a "childhood neurosis", from the adult's point of view, consists of some inadequate conception of "reality" by the child. It is a "mistake" which the child will learn to correct as he grows older and more mature. By extension, "neurosis" in an adult is a partially childish view of "reality" (or a so-called minimal break with reality) by an adult. This

concept of neurosis is clearly not wholly without merit since it correctly identifies the problem which the persistence of earlier, repressed ideas, affects and object-relationships may create. To regard this as a "disease", akin to a bodily disorder, however, is misleading. Moreover, the position of the observer must be clearly reckoned with and the influence of education and of social factors in general carefully estimated, if farfetched inferences are to be avoided. Otherwise, by a vigorous application of Freud's idea of "childhood neurosis" one would be justified to go as far as to say that in comparison to a mathematician the average adult suffers from a severe "neurosis" because of his (comparatively) immature ideas about calculus.

The conceptual difficulties, if not confusion, that surround the problem of what constitutes an "infantile neurosis" have been discussed at length in a recent symposium on this subject (14). Both Anna Freud (6) and Hartmann (11) made important contributions to this problem, and the interested reader will profit richly from their comments. Indeed, many of their considerations illustrate the sort of observation and inference which we have sought to systematize in this essay.

Summary

The concepts of normality, neurosis and psychosis are constantly used and are frequently criticized in psychiatry. We have sought to analyze these concepts in terms of their origin and actual current use. The results of this inquiry were ordered and presented according to five major frames of reference into which these concepts can be readily fitted.

The five frames of reference and the meanings of normal, neurotic and psychotic pertinent to each are as follows: 1) Medicine. Normal means "healthy", neurotic, "slightly or moderately ill" and psychotic "very ill". 2) Psychopathology. This framework is fashioned after the model of medicine. Normal means the absence of symptoms or "well adapted to reality"; neurotic means "ill with hysterical, or other, symptoms", or "slightly regressed" or having a "slight or moderate break with reality"; psychotic means having "delusions or hallucinations", or being "seriously regressed" or having suffered a "severe break with reality". 3) Treatment. In this framework normal means that no treatment is indicated, neurotic that treatment is indicated but not mandatory and the prognosis is good, and psychotic that treatment is imperative and the prognosis poor. 4) Social action. This framework is similar, but broader, than the framework of treatment. Normal again means that no action is in order. Neurotic means "eccentric" or otherwise only moderately socially deviant. The social action indicated is usually within the range of mild ostracism or fond admiration within a special social caste (e.g., art, religion). Psychotic means extreme social deviance and calls for serious social action (e.g., commitment). 5) Moral judgment. In this context, normal means "good", neurotic "slightly or moderately bad", and psychotic "very bad".

In addition to these multiple meanings of normal, neurotic and psychotic, according to the specific social settings in which they are used, it is noted that the concepts of normal and abnormal, and the associated notions of what constitutes the "illness" for which the patient is being "treated", have undergone significant changes during the brief history of psychoanalysis. These changes stem from, and reflect the influence of, psychoanalytic therapy on psychoanalytic theory, and demonstrate the operational character of psychoanalysis as a science. The concept of "mental disease" in psychoanalysis has evolved from "symptom-as-disease", through the notion of "character disorder" (or, "character neurosis"), to the present phase based on the assessment of "analyzability". The corresponding concepts of "cure" (or therapeutic change) are: absence of symptom, character change and structural change.

In conclusion, a few comments on excerpts from the pertinent psychiatric literature are offered in order to illustrate the theoretical considerations that have been set forth. The chief emphasis in this essay lies in calling attention to the limited relevance of the concepts of normality, neurosis and psychosis.

If scientific clarity and accuracy in relation to the problem of mental health and illness are earnestly sought and if they are to be achieved, it appears that instead of global, trans-cultural and multi-situational definitions

of these concepts, the acceptance of limited, situational definitions—and perhaps the differentiation of numerous meanings in place of a single and comprehensive, but vague and unreliable, idea—appears to be necessary and desirable (21). This essay is offered as a contribution toward this goal.

BIBLIOGRAPHY

1. Bowman, K. M., and Rose, M.: A criticism of the terms "psychosis", "psychoneurosis", and "neurosis". *Am. J. Psychiat., 108:* 161, 1951.
2. Brolley, M., and Hollender, M. H.: Psychological problems of patients with myasthenia gravis. *J. Nerv. & Ment. Dis., 122:* 178, 1955.
3. Diethelm, O.: The fallacy of the concept: Psychosis. In *Current Problems of Psychiatric Diagnosis.* Hoch, P. H., and Zubin, J., Editors. New York: Grune & Stratton, 1953, pp. 24–32.
4. Fairbairn, W. R. D.: *Psychoanalytic Studies of the* Personality. London Tavistock Publications, 1952.
5. Fenichel, O.: *The Psychoanalytic Theory of Neurosis.* New York: W. W. Norton & Co., 1945.
6. Freud, A.: Problems of infantile neurosis. In *The Psychoanalytic Study of the Child,* Vol. IX. New York: International Universities Press, 1954, pp. 9–15 and 68–71.
7. Freud, S.: *A General Introduction to Psychoanalysis.* Garden City, New York: Garden City Publishing Co., 1943.
8. Freud, S.: *Civilization and Its Discontents.* London: Hogarth Press, 1946.
9. Freud, S.: *The Future of an Illusion.* New York: Liveright Publishing Corp., 1949.
10. Gitelson, M.: Therapeutic problems in the analysis of the "normal" candidate. *Internat. J. Psychoanalyses, 35:* 174, 1954.
11. Hartmann, H.: Problems of infantile neurosis. In *The Psychoanalytic Study of the Child,* Vol. IX, New York: International Universities Press, 1954, pp. 31–36.
12. Hartmann, H.: Psychoanalysis and the concept of health. *Internat. J. Psycho-Analysis, 20:* 308, 1939.
13. Jones, E.: The concept of a normal mind. In *Papers on Psycho-Analysis,* Chapter 9. Baltimore: The Williams & Wilkins Co., 1948.
14. Problems of infantile neurosis. In *The Psychoanalytic Study of the Child,* Vol. IX. New York: International Universities Press, 1954, pp. 9–71.
15. Reider, N.: The demonology of modern psychiatry. *Am. J. Psychiat., 111:* 856, 1955.
16. Szasz, T. S.: Commitment of the mentally ill: "Treatment" or social restraint? *J. Nerv. & Ment. Dis.* (to be published).
17. Szasz, T. S.: *Pain and Pleasure. A Study of Bodily Feelings.* New York: Basic Books, 1957. (See particularly Chapters 4 and 5.)
18. Szasz, T. S.: Psychiatric expert testimony: Its covert meaning and social function. *Psychiatry 20:*313, 1957.
19. Szasz, T. S.: Some observations on the relationship between psychiatry and the law. *Arch. Neurol. & Psychiat., 75:* 297, 1956.
20. Szasz, T. S.: Some observations on the use of tranquilizing drugs. *Arch. Neurol. & Psychiat., 77:* 86, 1957.
21. Szasz, T. S.: The problem of psychiatric nosology. A contribution to a situational analysis of psychiatric operations. Read at the 113th annual meeting of The American Psychiatric Association, Chicago, Illinois, May 15, 1957. *Am. J. Psychiat.* (to be published).

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THE EFFECT OF DEATH ON THE PSYCHIATRIC SITUATION OF THE RELATIVES[1]

With Report of an Unusual Case

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The termination of life presents a constant problem to the physician responsible for the welfare of the survivors, and the effect of the death of a close relative on the psychiatric patient is always a matter of grave concern.

This problem was brought to our attention when the husband of one of our hospitalized patients committed suicide after he had been removed from a state psychiatric hospital.

The uniqueness of the situation prompted a search of the literature in an attempt to compare our findings and impressions with those of other workers in similar cases. Although the literature is not bare of reports of patients who suffered acute psychiatric upsets following the death of a spouse from natural or other causes (3, 4), we were unable to find any account of the experience of working with a patient in which this trauma occurred during the psychiatric illness.

The psychoanalytic theory that depression is a manifestation of hostility toward the introjected object is well documented (1), but the concept of depression as stemming from frustration of the aggressive drives has not been as widely disseminated (2). An extension of the theory of depression explains suicide as hostility to and destruction of the internalized object. However, all suicides do not necessarily occur in such a setting. It has been stated that the suicide is usually unsuccessful in producing much sorrow in the person toward whom the hostility is directed.

These theories appear compatible, but none of them offers much idea as to what is to be expected when the trauma of the suicidal death of the spouse occurs to a person who is already depressed. This situation presented a unique opportunity to study the patient's response to this trauma and a therapeutic advantage where the factors of guilt and hostility of the present could be clearly examined and related dynamically and genetically to the past.

[1] Presented at the Southern Psychiatric Association Meeting, October, 1953.

Case Report

Mrs. M. W.—a white female, age 48, was admitted to the psychiatric unit on March 22, 1953, on the recommendation of her physician because of "nervousness". She had been nervous all her life, somewhat more so in the previous seven years, but had been almost incapacitated by it in the five months prior to admission. In June, 1951, her husband began to show signs of a mental disturbance which worried her a great deal. With great trepidation she discussed this with her husband's family several months after she first noticed his self-destructive behavior, and, after they consented he was committed to a State mental hospital in February, 1952. The unanimous opinion of the attending doctors was that he had "premature hardening of the arteries" and was incurable. But his family was not completely convinced, and one of his nieces, Miss E., said that the patient could have her husband discharged since he was well but that she did not because she did not wish to have him at home again. When the patient first became aware of these rumors in October, 1952, she was very disturbed by them. A new preacher arrived in her town in November, 1952, and the patient very quickly became obsessed with thoughts of being in love with him which increased her "nervousness". She became absorbed in her housework and "forgot" her habits of writing and sending packages to her husband. Being at home alone, especially at night, became a frightening ordeal, and on several occasions she thought there was a prowler in the house who was going to harm her. During this period she began to suffer from severe headaches, crying spells, increasing agitation and depression.

The patient had had a very disturbed childhood. Following the death of her mother, when she was four years old, her father had deserted his six children; she had always hated him because of this and felt it was his fault that she had an unhappy life. The relatives and family friends who raised her made her feel unwanted and were cruel to her. At age 18 she married a man ten years her senior because it was a way of escaping from her relatives and obtaining security. The marriage was not satisfactory, and the patient had several short, unhappy extramarital affairs in an effort to obtain some satisfaction. At 31 she delivered her only child, a son, who is the only person in the world who has meant anything to her. She felt nobody loved her, she loved nobody, she did not trust people and did not like to be around crowds.

The patient was diagnosed as having a psychotic depression; because she related and verbalized well, psychotherapy was decided upon as the procedure of choice in line with the teaching program.

Course of illness. The patient showed marked ambivalence toward her husband by saying, on one occasion, that she wished him to get well and return home, and another time saying she never loved him, hated him and never wanted him back. But she never realized that she was attesting partially to the veracity of Miss E.'s accusations. She was in a dilemma over her feelings for the preacher. Her guilt about her marital infidelities distressed her severely, and she talked about this a great deal. There was no sparing of herself in the self-recriminations, and she discussed all of her guilty deeds. She even felt that she was responsible for the death of her younger sister, age 2, when the patient was four and a half, because she had not called her grandfather for help since she hated him. Frequently she expressed her hatred of men, particularly her father, husband and grandfather. There was continual weeping as she related these painful experiences, feelings and thoughts; afterwards there was some increased comfort with decreased depression and anxiety. However, this was evanescent, and she gained no insight.

Unbeknown to the patient her husband had been removed from the hospital by his niece and had committed suicide on April 16, 1953. She was not notified for two days because Miss E. felt that the patient should not attend the funeral. At the funeral the patient expressed no grief because she said she was in a "terrible rage against Miss E."; thereafter she was obsessed with thoughts of killing her since she had been instrumental in the suicide. But she also said she had not wanted her husband to get well or return home because for the first time in her life she felt free after he was hospitalized and was glad to hear the doctors' poor prognosis of his condition. At this time she brought out feelings about her only love, an adolescent platonic affair, and she still yearned for this man. Her feelings toward the preacher continued to disturb her for some time. Overshadowing her guilt about all these things was her vehement and frequent expression of hostility and rage toward Miss E.

About a month after the suicide she realized there was something wrong with her, and she thought she was crazy because she had not cried over her husband's death. If he were dead, she would have cried, but she felt that it was all a bad dream and he had not died. From then on she spoke of him as an ideal husband with no hostility or resentment toward him. Following this she was upset by her guilt feelings about sending her husband to the hospital and the question of whether he actually was dead. In June she had a dissociated reaction during which she expressed grief about her husband's death, but she remembered nothing of this the next day. For some weeks afterward she struggled with her guilt feelings about being responsible for her husband's death, her anxiety and guilt over not crying, her feelings of unreality about the suicide, and her rage towards Miss E. She began to gain some psychiatric insight, and her rage against Miss E. decreased.

She gradually felt that her husband had died but still felt that it was a dream most of the time. However, she began discussing some of the practicalities of her situation such as her debts and her son's future; she was very disturbed about her inadequacy in handling these problems. In this connection, referring to her husband, she said, "If only Daddy were here he would help," but she did not cry. There was great concern about her antagonism toward her son because he now planned not to return home to be with her but to stay in New Orleans for some special trade training. At this time the therapist informed her of his impending departure for military service in several weeks, and this was very disturbing to her. Her productions now consisted of her concern about reality problems of her future, her son's future and her debts.

Several weeks later she sought out a senior staff man to discuss her problems after she had become perturbed with the therapist several days before because he had not agreed with her about forcing her son to return home with her. In this setting she talked about her husband's death, her father's desertion, her hatred for her father, her son's leaving and her therapist's leaving. She had a marked grief reaction. Following this she was more normal in behavior, mood and composure. It was obvious that she was completely over her depression and mourning.

Discussion

The guilt of the patient over committing her husband is obvious, and coupled with it is her resentment towards him because of the satisfactions she felt she had missed. Her phantasies about possible satisfactions from other sources may be suspect, but they do not seem to have been particularly malignant.

Disregarding other factors, it appears that the immediate precipitating cause of her depression was the frustration which occurred when Miss E. hinted at the patient's hostility toward her husband. Thereafter she was plagued by her guilt feelings and could not enjoy her new-found freedom. This was due to her very stern conscience which was in constant struggle with her instinctual desires and which overwhelmed them and her. A person with greater ego capacities might not have succumbed.

The theory of the introjection of the hostility to the hated love-object as a cause of depression after the death of the love-object can also be applied here if the husband's departure to the hospital is equated with death in the unconscious.

The death of the husband under circumstances that completely absolved her of all responsibility made possible a rearrangement of psychic energy. Following his suicide there

was a temporary flare-up in her guilt feelings, but there was less hostility toward him. The hostility that had previously been directed at her husband and covered with guilt thereafter was directed at the niece, and this could be felt without any feeling of guilt. This deflection of hostility to the niece relieved her of a tremendous burden of suffering and was the turning point in her recovery from depression. It is possible that her husband's death was a reminder and an unconscious symbolic equivalent of her father's desertion so that her behavior was over-determined.

One of the outstanding things noted was the complete masking of any feeling of grief about the loss of her husband, and this was thought to be due in part to her guilt feelings about her husband and was considered not to be the result entirely of her depression but to be mainly the problem of working through her mourning. The therapeutic end point looked for was a grief reaction, and this occurred four months after the husband's death. Whether this would have occurred at that time if the patient had not been faced with a repetition of the trauma of separation from both her son and her therapist is open to speculation, but it seems unlikely.

It is interesting and more than coincidence that she sought out, expressed her concern, and displayed her grief to one of the senior staff, as much of her discussion on that occasion dealt with her feelings of resentment toward her father for having deserted her when she was four.

Summary

Following the death of a loved one, the survivor may have either a grief reaction or a depression. The patient described was already depressed at the time of her husband's suicide which occurred in a set of circumstances that were eventually beneficial in overcoming the depression. The working through of her mourning was apparently hastened by the fortuitous impending separation of her son and therapist.

BIBLIOGRAPHY

1. Abraham, K.: *Selected Papers on Psychoanalysis.* New York: Basic Book Journ., 1953, pp. 41–476.
2. Bibring, Edward: *Affective Disorders.* New York: International Universities Press, Inc., 1953, pp. 13–46.
3. Davis, D. R.: Recovery from depression. *Brit. J. M. Psychol., 25:* 106, 1952.
4. Talkin, Leonard: Clinical evaluation of psychiatric disorders in the aged. *Geriatrics, 7:* 56, 1952.

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AN EVALUATION OF COMMONLY USED CRITERIA FOR THE DETECTION OF SEIZURES IN SUCCINYLCHOLINE AND ATROPINE MODIFIED ECT[1]

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Investigators (3, 9, 11, 13, 14) who have studied various aspects of electroconvulsive therapy as modified by succinylcholine have commented upon the difficulty in determining whether patients had experienced grand-mal seizures during such treatment. It is known that the characteristic skeletal muscle signs, especially tonus and clonus, are often distorted or obliterated by the administration of succinylcholine, while the common autonomic signs are modified by the customary use of atropine sulfate as premedication.

In the course of the treatment program at the Syracuse Veterans Administration Hospital, this same problem arose when it was noted that many patients failed to demonstrate the expected therapeutic response to ECT when modified by succinylcholine, atropine, and pentothal. The absence of grand-mal discharge in the brain was advanced as a possible explanation of these failures. In pursuing this hypothesis, it first seemed necessary to evaluate the clinical criteria commonly employed as indicators of the occurrence of grand-mal seizure. This paper presents the results of such an investigation.

The diagnostic criteria studied, all frequently mentioned in the literature (2, 5, 6, 7, 8, 10), included such manifestations as: "mild tremors", "clonus of the forehead, the lids, feet, sternomastoids . . . orbicularis ori and oculi . . . ", "palpation of the extremities for movement", and "muscle stiffness", and autonomic changes such as pupillary size and reaction to light, or contraction of piloerector muscles.

In evaluating these criteria, we used electroconvulsive therapy modified by succinylcholine to the point of maximum skeletal muscle paralysis, verifying the occurrence of grand-mal type discharge by electroencephalographic tracings.

[1] This study was carried out using the facilities and patients of the Syracuse Veterans Administration Hospital, Syracuse, N. Y.

PROCEDURE

The subjects studied were 11 adult male patients for whom ECT was prescribed during the period of time covered by the study. They ranged in age from 31 to 62 years. During the period of the study these patients received a total of 94 treatments.

Patients were fasted for five hours prior to therapy and were premedicated with atropine. Treatments were given in the EEG room with full anesthetic precautions. Initially, baseline EEG was recorded using bilateral parietal and occipital leads. The anesthesiologist then gave intravenous pentothal to the point of sleep, to avoid the apprehension caused by respiratory paralysis. This was followed immediately by intravenous succinylcholine, in doses intended to produce maximal skeletal muscle paralysis. The dosage of succinylcholine varied from 20 to 100 milligrams. While waiting for either the usual muscular fasciculation of "depolarization" or for 30 seconds after the injection, oxygen was administered using manual positive pressure. Electrodes from a Medcraft Model B 24 were then applied to the temporal areas and the electrical stimulus given. The electrical stimulus used in the first treatment was intended to produce a grand-mal discharge. The stimuli used in subsequent treatments were gradually reduced to subthreshold level in an attempt to provide sufficient data on non-grand-mal patterns.

Immediately after the electrical stimulus ceased, EEG's were taken at frequent intervals. While the EEG's were actually being recorded, independent observers who were present during the entire treatment process, and all other personnel, were required to remain motionless to prevent the artifacts produced by static electricity from appearing on the tracings. Carefully recorded clinical observations were made before and after the treatment for such autonomic responses as pupillary size and reaction to light, and state of contraction of

the piloerector muscles. The skeletal muscles of the face, neck, feet and hands were examined and palpated for movements, and a frequent effort was made to elicit ankle clonus. When the patient regained consciousness, the EEG recording was terminated, and he was questioned for evidence of confusion and disorientation.

The EEG tracings thus obtained were separately presented to and interpreted by a neurologist who, having no knowledge of the clinical observations, classified each tracing dichotomously for the presence or absence of a degree of abnormality consistent with the occurrence of grand-mal seizure. This classification considered such EEG phenomena as the alteration or obliteration of the baseline pattern and the appearance of spontaneous, generalized, abnormal wave forms.

Results and Conclusions

Out of the total of 94 electroconvulsive treatments, 81 were interpreted via EEG as having been of the grand-mal type and 13 of the non-grand-mal type. Table 1 indicates the percentage frequency of occurrence of the various clinical signs of grand-mal seizure in each of the two groupings.

It will be noted that whether EEG's revealed grand-mal type discharge or not, fairly strong transient contractions of the orbicularis ori and oculi, and of the masseter muscles, lasting throughout the stimulus and subsiding as soon as the current ceased to flow, were observed. These facial contractions were believed to be a phenomenon different from the sustained tonus of the grand-mal convulsion and were therefore tabulated separately.

TABLE 1.—Percentage of EEG Identified Grand-Mal and Non-Grand-Mal Treatments Exhibiting the Clinical Signs

	Type of Seizure Pattern (by EEG)	
	Grand-mal	Non-grand-mal
	%	%
Tonus, sustained	47	0
Clonus	81	0
Ankle clonus, elicited	66	0
Autonomic system signs (total)	95	83
Change in pupil size	82	45
Fixation of pupils to light	92	33
Contraction of piloerector muscles	91	75
Transient facial contractions	100	100
Confusion and disorientation, after treatment	100	100

Inspection of the data seems to warrant the following conclusions:

1. None of the clinical criteria studied, skeletal muscular or autonomic, is a consistent indicator of the occurrence of grand-mal seizure, as identified by EEG.

2. The appearance of tonus and/or clonus, although not a consistently dependable index, in that they were not always observed in all grand-mal type reactions, is nevertheless positively associated with the occurrence of grand-mal since they never appear in its absence.

3. Transient contractions of the facial muscles, occurring during the flow of electrical current and ceasing immediately thereafter, were universally observed and, therefore, do not appear to be specifically related to grand-mal seizure, a distinction which has not hitherto been clarified.

4. Similarly, confusion and disorientation following treatment are invariably seen with both grand-mal and non-grand-mal discharges.

It is worth noting that a simple clinical test suggested by Adderley and Hamilton (1) and mentioned by Davis (4) and Sargent and Slater (12, p. 114), but not included in our study, and not widely used in the United States, from physiological considerations may deserve future study. This test consists of occluding the arterial circulation to one arm with a sphygmomanometer cuff just prior to the administration of the succinylcholine and observing the arm for the signs seen in unmodified seizure.

Summary

Ninety-four ECT treatments using succinylcholine, atropine, and pentothal in 11 adult male patients were carefully observed for the appearance of common signs of grand-mal seizures. When the responses to the ECT were evaluated via EEG as grand-mal or non-grand-mal in type, and compared to the clinical observations, it seemed clear that none of the clinical criteria commonly being used is of much dependability. It was suggested that the simple tourniquet test described by Adderley and Hamilton warrants investigation.

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BIBLIOGRAPHY

1. Adderley, D. J., and Hamilton, M.: Use of succinylcholine in ECT, with particular reference to its effect on blood pressure. *Brit. M. J., 1:* 195, 1953.
2. Alexander, L., Gilbert, I. E., and White, S. E.: Unidirectional electroshock relaxed by succinylcholine chloride. *Confinia neurol., 13:* 324, 1953.
3. Bourne, J. G., Collier, H. O. J., and Somers, G. F.: Succinylcholine (succinoylcholine); muscle relaxant of short action. *Lancet, 1:* 1225, 1952.
4. Davis, D. A.: Pharmacology and clinical application of succinylcholine. *South. M. J., 47:* 97, 1954.
5. Glover, B. H., and Roisum, B. H.: The use of anectine (succinyl-choline-chloride) in electroconvulsive therapy; A simplified technique. *J. Nerv. & Ment. Dis., 120:* 358, 1954.
6. Holt, W. L., Jr.: Succinylcholine chloride in private practice of electroshock therapy. *New York J. Med., 54:* 1918, 1954.
7. Lincoln, J. R., and Broggi, F. S.: Safe management of modified electrotherapy; Routine use of a muscle relaxant and oxygen. *New England J. Med., 253:* 546, 1955.
8. Malone, J. B., and Blayney, A. M.: Modified electroconvulsive therapy. *Irish J. M. Sc., Series, 6:* 315, 1952.
9. Moss, B. F., Jr., Thigpen, C. H., and Robison, W. P.: Report on use of succinylcholine dichloride (curare-like drug) in electroconvulsive therapy. *Am. J. Psychiat., 109:* 895, 1953.
10. Reitman, H. S., and Delgado, E.: Technique for the modification of electroshock with succinylcholine. *Dis. Nerv. System, 16:* 237, 1955.
11. Robie, T. R.: Succinyl softened electroshock. *Am. J. Psychiat, 111:* 549, 1955.
12. Sargent, W., and Slater, E.: *An Introduction to Physical Methods of Treatment in Psychiatry*, 3rd ed. Baltimore: The Williams & Wilkins Co., 1954.
13. Schiele, B. C., and Margolis, P. M.: Value of succinylcholine chloride in electroconvulsive therapy. *Minnesota Med., 38:* 1, 1955.
14. Wilson, W. P., and Howill, W. K.: Succinylcholine chloride in electroshock therapy. I. Clinical use. *Arch. Neurol. & Psychiat., 71:* 122, 1954.

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NEUROLOGIC ASPECTS OF THE BODY-MIND PROBLEM[1]

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Of the various aspects of the body-mind problem, I should like to discuss here only those that can be approached by neurologists and neurophysiologists, particularly since the various interpretations that philosophical theories have offered have been unable to give generally acceptable answers. I refer in this latter respect to the excellent survey by Dr. Kuhlenbeck (23). The multitude of such theories is the best indication that none of them has been able to provide an indisputable solution to the problem. Some lead to rather paradoxical and absurd inferences, e.g., the view that material objects exist only through being perceived embodies the statement that in the moment when we close the eyes the objects no longer exist, and in the moment when we open the eyes again the objects are "recreated". Idealistic systems also find considerable difficulties in answering the objection that very probably other stars and solar systems existed millions of years before organisms displaying mental phenomena developed on our planet. Few scientists will be inclined to accept Bergson's view (4) that thought is to a large extent independent of the brain. But also materialistic systems assuming the reality of the physical space-time appear rather unsatisfactory in their inability to give an explanation for the phenomenon of awareness. Neither the doctrine that the mental phenomena are not different from the physical ones nor the dualistic view that regards matter and mind as two separate worlds between which logically a bridge cannot exist helps us to obtain insight in the phenomena of awareness. One hardly comes nearer a solution if one more or less ignores mental phenomena or denies them as the behaviorists do. Finally the compromise solution of a psycho-physic parallelism has all the characteristics of a bad compromise in that it assumes that physical and psychic phenomena are somehow coupled, but leaving the problem of this coupling unanswered or unanswerable. The assumption of such a parallelism would perhaps be acceptable for primitive processes, e.g., if one considers pain as a psychic correlate of protective reflexes. For more complex mental phenomena the assumption of such a parallelism hardly serves a useful purpose.

Thus it may perhaps be best to disregard preconceived philosophical views and to limit oneself to the question as to which parts of the brain are indispensable for those neural processes that are a prerequisite for the appearance of mental phenomena, and which characteristics these neural processes display. Although some of these processes, such as the perception of retinal impulses in primates, depend on the intactness of the respective cortical projection areas, one may consider it as an established fact that also in man the nervous processes upon which the existence of mental phenomena depends are not limited to the cerebral cortex. There are not only in lower vertebrates types of behavior suggestive of mental phenomena that are related to subcortical structures, as for example, the tectum and the basal ganglia of birds, the tectum mesencephali and the reticular substance of the midbrain of anamnia (55); but also for the brain of higher mammals and of man the participation of subcortical areas in the genesis of mental phenomena has become evident. Not only in decorticated monkeys (20), but also in human malformations with missing prosencephalon, an alternation between a sleeping state and a certain degree of wakefulness with signs of a primitive state of consciousness can be observed.

Thirty years ago in experiments dealing with the sleep-waking mechanism I observed together with Dr. Inaba (48) at least transitory states of sleep following thalamic lesions in dogs; the inference was drawn that primitive states of consciousness depend on the intactness of the thalamus. These observations were confirmed to a certain extent by the experiments of Harrison (16). Although the states of sleep appearing after hypothalamic lesions (36) are more pronounced, they also are only

[1] Presidential address delivered before the Philadelphia Neurological Society, January 3, 1957.

transitory; and recent experiments with Dr. Szekely (42) show that in cats in which the sleep induced by hypothalamic lesions was followed by a sleep-waking rhythm, subsequent lesions of the dorsal thalamus were again able to produce a state of sleep.

The thalamus has been called by Nissl a key to an understanding of the cerebral cortex. Together with Dr. Wycis (45) we learned the truth of this statement, in particular for the so-called frontal association areas in man. In our material of thalamotomies, in the acute stage following bilateral lesions of the dorsomedial nuclei, we were able to observe a syndrome that is in many respects similar to that seen after prefrontal leucotomies, although some differences may be found, particularly as far as the absence of severe disturbances of personality is concerned. Thus neural processes in the thalamus seem not only to be associated with a primitive state of consciousness but also seem to form the prerequisite for cerebral processes related to conscious phenomena.

While the results of interruption of the fronto-thalamic circuits support the theory of cortico-diencephalic interaction in the mechanism of emotions, our further experiences suggest the importance of additional processes in the diencephalon itself, in other words, of intradiencephalic mechanisms. It is known from the experiences of Peyton and others (33) that also after bilateral frontal lobectomy, i.e., after ablation of both frontal lobes, pathologic emotional patterns rather similar to those observed preoperatively may return. Our own experiences with Wycis (46) have shown that in patients who have relapsed despite extensive prefrontal lobotomy and in whom the previous emotional disorder returned, remarkable improvement can still be obtained by dorsomedial thalamotomy. Since in these cases those cell groups of the dorsomedial nuclei are degenerated, where fibers entering the frontal lobe originate, the conclusion has to be drawn that the favorable effect of the procedure is due to destruction of those elements of the dorsomedial nuclei which serve the connection with the hypothalamus, in other words, that it is due to interruption of intradiencephalic circuits.

Penfield and Jasper (32) are even inclined to regard the "centrencephalic system" localized in the upper brain stem as the highest level of cerebral activity, where incoming impulses are projected after a detour over the cortex and from which the initiative for voluntary movements is supposed to originate. This hypothesis is based on the experience that various cortical areas of both hemispheres may be functionally integrated from the subcortex and that sensory, motor, or psychical cortical areas can be activated without arresting the neural mechanisms that are necessary for conscious thought and for initiation of voluntary action. It would seem that considerable additional evidence will be required before this intriguing hypothesis can be developed into a theory, particularly in view of the fact that the nuclei forming the centrencephalic system, i.e., in the midbrain the reticular formation, in the thalamus the midline nuclei, the intralaminar nuclei, the reticular nuclei, the centrum medianum, the posterior hypothalamus, retain their rather primitive type in the whole phylogenetic mammalian series, and that their morphology by no means shows the progressive development observed in the ascending phylogenesis in the cerebral cortex (23).

The importance of impulses ascending from the reticular substance, particularly of the mesencephalon, for cortical activity has been emphasized in recent years particularly by Magoun (28) and his school. Without detracting from the importance of Magoun's work, it seems fair to mention that the significance of the reticular formation for various functions has been recognized by previous authors. Steiner's (55) extensive experiments in anamnia induced this author to designate the reticular substance of the midbrain as a general center of motility. In an analysis of decerebrate rigidity in 1925 I was able to show in cats with Dr. Bernis (5) that bilateral lesions of the vestibular nuclei are not able completely to abolish this rigidity but that the lesions must encroach upon the reticular substance in order to abolish the rigidity; and it was concluded that important tonus-maintaining reflex arcs are centered in the reticular substance of the medulla oblongata and pons. Flechsig (11), Kohnstamm (22), and Wallenberg (58) have recognized that sensory impulses synapse in this area. Flechsig in 1896 (10) probably was

one of the first to describe numerous fibers from the sensory cranial nuclei entering the reticular substance and fibers from the upper end of this area joining the lemniscus on its way to the thalamus. The whole complex of these fibers has been called by Flechsig "Haubenstrahlung". Wallenberg (58) emphasized that the reticular nuclei are not only motor reflex centers and points of synaptic interruption of single sensory pathways but that here an integration of various types of sensory impulses may take place before they reach higher parts of the central nervous system.

Summing up we may therefore distinguish 1) conscious processes for which the intactness of circumscribed cortical areas is indispensable as, for instance, visual perception in primates. 2) Primitive conscious processes that are maintained also in man even in the absence of the cerebral cortex and for which apparently the connection of lower parts of the CNS with the thalamus and perhaps even with the midbrain is sufficient. 3) Intradiencephalic processes as shown in the effect of thalamotomy following prefrontal leucotomy upon emotional states. 4) Cortico-subcortical circuits, for instance those between parts of the thalamus (dorsomedial nuclei and anterior nuclei) and the frontal lobe that are a basis of an interaction of these areas. Subcortical areas are able to facilitate cortical activity as shown by the alerting reaction on stimulation of the reticulate substance or they may inhibit it as suggested by the experiments of Hess (17) and Hunter and Jasper (18).

Regarding the mechanisms of the nervous processes associated with consciousness, the advances of electroencephalography, on the one hand, and the technical development of electronic computing machines, on the other, have encouraged an astonishing amount of speculation. The question does not seem unjustified how far the theory of communication resulting from an analysis of these electronic brains, the science of cybernetics, has contributed to a better understanding of the mechanisms of higher cerebral function or contributed to the finding of significant new neurophysiological knowledge. It need not be emphasized that the circuits devised by electronic engineers seen from the point of view of the neurophysiologist are only analogies; and it remains to be demonstrated how far analogous processes exist in the central nervous system. We know that a certain problem of engineering may be solved by various different circuits, and for a certain psychic process numerous physical analogies can be offered; e.g., memory processes have been compared by various authors with localized traces in the form of pores (Descartes), etchings (Lamarck), the chemical processes underlying photography, electromagnetic processes similar to those in modern wire or tape recorders, with ferromagnetic hysteresis (9). Others assumed decreased synaptic resistance, reverberation of impulses similar to electric impulses circulating in the so-called delay lines of electronic computers (37), or synchronization in cell groups acting like loosely coupled oscillators with a resulting complexity of rhythms (35). There is, however, no proof that any of these processes reflects, or has any similarity to, those mechanisms taking place in the formation of memory.

While the heuristic value of such theories should not be denied, it must be admitted that the result of such attempts at analogies with physicochemical processes is rather modest as far as the application of electronic circuits upon actually known neural circuits is concerned. An analogy that may perhaps be fruitful for the understanding of various cerebral circuits is that of servomechanisms in which the changes resulting from the work of a machine have a retrograde effect upon the output of the machine so that it remains more or less constant. If the result achieved exceeds the desired value, the activity of the machine is decreased, an effect that radioengineers call negative feedback. An example is the thermostat that shuts off the electric current of a heating system on reaching a certain temperature and turns it on again if the temperature drops below a certain level. We deal here with a principle that has been long known to neurologists although not under this name. The ataxia of the tabetic has been explained long ago by the loss of afferent, chiefly proprioceptive impulses, in other words the loss of a mechanism regulating the extent of voluntary movements by impulses returning from the contracting muscles to the innervating efferent motor apparatus. Another rather well-known neuroregulation that can be regarded in terms

of a feed-back mechanism is the Hering-Breuer reflex, the self-regulation of respiration. The distension of the alveoli of the lungs caused by inspiration elicits afferent vagal impulses that inhibit further inspiration and elicit expiration. This principle can also be applied without difficulty to higher cerebral mechanisms, e.g., in the mechanism of emotions, changes in the vegetative system induced by emotional disturbances may elicit afferent impulses that act upon the central emotional mechanism as pointed out by Kuhlenbeck. Another example is the activity of the cerebellum that receives cortico-fugal impulses by way of collaterals from the pyramidal tract and then by the brachia pontis and is able to regulate this cortico-fugal activity by its efferent impulses that reach the motor cortex by way of the nucleus ruber and thalamus.

Another analogy with electronic circuits that has been offered is the attempt to compare the mechanisms in the visual or auditory cortex with the scanning mechanism known from television and to attribute such a scanning function to the alpha rhythm (34, 59). It is assumed that the α rhythm is generated in the association areas and sweeps up and down in non-specific and associative afferents in the visual or auditory cortex. The sensory impulses arriving in specific afferents may be insufficient to pass the synaptic threshold in the various cortical layers; however, they may reach the threshold in the moment when the α rhythm passes the respective cortical layers due to the facilitating influence of the α wave. On this basis, one has tried to explain the recognition of shape regardless of size or of chords regardless of pitch. Experimental tests of the scanning theory have in some instances failed to support it (27). It has been quoted as confirmation that according to Murphree (30) the maximum time interval between two events that are perceived as simultaneous is 95 milliseconds, while the mean duration of the alpha waves is 98 milliseconds. In this respect, the observation of Bartley (3) is also of interest that flickering light appears brighter at frequencies corresponding to the alpha rhythm than at other frequencies. One can scarcely accept these findings as a definite proof of the scanning function of the alpha rhythm, and they may simply be explained by the association of certain phases of the α rhythm with fluctuations of excitability as shown by Bishop (6) and Lindsley (26). It seems also rather doubtful whether one should regard the scanning as the only function of the alpha waves, since such an alpha rhythm could be demonstrated not only in the cortex but also in subcortical ganglia such as the thalamus not only in animal experiments (41) but also in the human electrothalamogram (43). This rhythm was noticeable in my experiments also in decorticated cats. Whether the theta rhythm scans for pleasure as suggested by Walter seems still more debatable.

Electrographic studies have contributed to an understanding of the cortical processes associated with awareness in that they have shown that the entrance of afferent impulses from a receptor in the respective cortical projection area is by no means sufficient in order to produce a conscious perception. This can be inferred from the fact that evoked potentials elicited by stimulation of various peripheral receptors or of afferent nerves are particularly well demonstrable in a state of deep anesthesia, when the background activity of the cerebral cortex is markedly reduced (12), although under the influence of certain toxins, as for instance in bulbocapnine catalepsy, cortical evoked potentials are demonstrable also in the waking state (56). The extent to which afferent impulses are dispersed over the cerebral cortex has been shown by simultaneous recordings from multiple cortical areas (25, 59). Although these records have failed to reveal a definite pattern that would contribute to a better understanding of the processes underlying the formation of percepts, they provide a basis for the concept that sensory impulses, after entering the cerebral cortex, become integrated more or less with the totality of cerebral processes. It seems not improbable that an irradiation to the subcortex as conceived by Penfield also plays a certain role. Le Gros Clark (7), for instance, believes that the initiation of a visual sensation is occasioned by the arrival of the optic impulses at the strip of the cortex which surrounds the area striata proper and from which the lower centers are thrown into activity. Conclusive evidence for such a mechanism, however, is lacking.

The concept that awareness of afferent impulses depends on their integration with other

cortical areas is substantiated by old clinical experiences showing that agnostic disturbances occur in lesions of zones adjoining the cortical projection areas of touch, hearing and vision, experiences that do not permit one to assume that these areas are so-called agnostic "centers" (in the sense of the old clinicians) but which may be interpreted in the sense that these zones represent nodal areas important for the integration of the impulses from the respective projection areas with other cortical fields.

In view of our limited factual information regarding the irradiation of sensory impulses in the cerebral cortex, the attempt of recent authors to develop theoretical concepts regarding the mechanism underlying the propagation of these impulses in the cerebrum seems understandable. Analyzing the development of adaptive behavior Ashby (2), for instance, assumes that the afferent impulses dispersed in the cerebrum become integrated in patterns according to a principle of ultrastability so that only those variables are retained which induce a stable state. According to Cragg and Temperley's theory (8), incoming afferent impulses induce a shifting of "domains", i.e., of patterns of neurons in a state of excitation, from the sensory to the motor area, but without the existence of fixed circuits. The variability of the response of single cortical neurons shown by microelectrode studies seems to support such a concept.

These theories have been developed rather independently of anatomically known fiber systems and circuits, and their importance is even denied by some authors. The question arises whether one has to abandon an anatomical concept in order to understand the known experiences. It seems rather inconsistent to accept for certain functions such as the cortical representation of peripheral receptors or for the origin of efferent fibers a definite localization in circumscribed cortical areas and to deny definite interconnecting systems. It should be admitted that despite extensive lesions some of the so-called higher functions of the central nervous system may be retained to a large extent or may become restituted, as has been experienced particularly in the last decades following psychosurgical procedures. It seems, however, that one can account for these experiences without disregard for the importance of the anatomical structures of the brain, if one recognizes a multiple representation of certain functions, although, of course, such a high degree of equipotentiality as has been shown in lower mammals as in the rat (24) can not be expected in the human cerebrum.

This principle of multiple representation becomes very obvious, particularly if one analyzes the central apparatus related to the conduction and perception of pain impulses. Physiologic as well as neurosurgical experiences have shown that the afferent conduction of pain is not limited to long systems such as opposite or homolateral spinothalamic tracts; there exist also chains of neurons conducting pain that cross the midline repeatedly (1, 19, 21, 38, 47, 49). The conduction in the reticular substance may play an important part in this connection (58). The existence of these bypaths explains that, at least in certain cases, the hemianalgesia produced by interruption of the spino-thalamic system may regress to a large extent. Also pain conduction in the gray matter around the aqueduct is to be considered since this area is extremely sensitive even to mechanical stimulation (50). As to the importance of various levels of the central nervous system for the formation of pain experience, it may suffice to mention briefly that interruption of the fronto-thalamic circuits by prefrontal lobotomy (13) or thalamotomy (45) does not increase the threshold for pain sensation but reduces only the emotional reactions accompanying the pain perceptions. Lesions of other cortical areas such as the lower parietal lobe may induce pain asymboly as shown by Schilder and Stengel (39).

Not only the cortex but also the endings of the spinothalamic system in the thalamus, i.e., the region that is usually related to the perception of pain impulses, seem dispensable as shown by numerous experiences with vascular destruction of this area. The appearance of intense spontaneous pain (Dejerine-Roussy syndrome) in such cases seems to indicate that the central mechanism which is a prerequisite for the pain experience takes place also in other subcortical areas. Walker (57) considered the importance of the tectum mesencephali. Our own experiences indicated that the hypothalamus plays a certain role (51).

It has been mentioned that emotional proc-

esses play an important part in the mechanism of pain experiences and that interruption of thalamo-frontal circuits in the frontal lobes or in the thalamus is able to reduce this component. A multiplicity of central mechanisms underlying emotions has been demonstrated by studies of basic emotional phenomena such as anxiety. Relapses may occur after initial reduction of emotional tension induced by interruption of the fronto-thalamic circuits. Subsequent interruption of the circuit between the anterior nucleus and gyrus cinguli by lesions of the anterior nucleus may result in at least a transitory relief showing the importance of an additional circuit between the anterior nucleus and gyrus cinguli that is a part of a larger circuit delineated by Papez (31) and connecting the hippocampus,[2] fornix, mammillary body, anterior nucleus, gyrus cinguli. Also following combined interruptions of this last named circuit plus the fronto-thalamic circuits by combined lesions of the dorsomedial and anterior nuclei, emotional disturbances may recur, at least in some instances. In such cases additional hypothalamic lesions may have a beneficial effect upon the emotional disturbances, an experience that indicates the importance of a further circuit of which the hypothalamus is a part [46]. One has here to consider particularly the connection of the hypothalamus with the orbital cortex (29). Finally we were able to observe that after relapses following extensive prefrontal lobotomies, lesions of the dorsomedial nuclei may induce relief. Since in these cases those cell groups of the dorsomedial nuclei that are connected with the frontal cortex were degenerated, these experiences seem to indicate the importance of intradiencephalic circuits, for instance between the dorsomedial nuclei and the hypothalamus. One may object that in these cases one deals simply with a quantitative reduction of the available brain substance. However, thalamic lesions outside the above mentioned areas and circuits do not have such an effect upon emotional disturbances, indicating the specificity of these areas, in other words showing that the effects are related to definite circuits.

[2] In a case observed by Glees and Griffith (15) a severe injury to the hippocampus induced initially agitation similarly as in our cats with lesion of the fornix (52), later loss of emotional drive and memory disturbances.

Similar experiences were made in our thalamotomy material regarding the disturbances in temporal orientation following lesions of the dorsomedial nuclei as well as of the anterior nuclei, while lesions in other parts, as for instance in the spino-thalamic system or pallidotomy, were not associated with such disturbances. Considering that such disturbances of temporal orientation appear also following lesions of certain cortical areas, particularly the parieto-occipital region, it may be inferred also regarding the mechanism of temporal orientation that we deal here with a multiple representation. Similarly Lashley (24) has recently assumed a multiple representation for the retention of memories although his concepts are somewhat different. He believes that within a functional area the cells throughout this area have acquired the ability to react in definite patterns which may have any distribution within this area.

Even for the cortical representation of motility a certain multiplicity of representation seems to exist as shown by Penfield's findings of secondary and supplementary motor areas. Similarly secondary areas have been found for the somatosensory and the acoustic cortical projections. For the acoustic pathways Galambos (14) assumed something similar in his principle of diversity. A multiplicity of the interhemispheric connections important in the mechanism of higher cerebral functions is indicated by the experience that following sagittal section through the corpus callosum no or slight disturbances only were found (40).

Further studies will have to analyze the distribution of impulses in these multiple systems, the patterns upon which the formation of percepts and images and the initiation of actions depend. There are, for instance, indications that one may distinguish for pain conduction in the brain stem, a main system that normally conducts the pain impulses and bypaths that are activated chiefly when the main system is eliminated or its function is depressed. Whether something similar applies to cerebral systems over which incoming impulses are dispersed remains to be studied. If and when such studies should succeed in characterizing the neural processes associated with conscious phenomena, then the moment may come for attempting a new philosophic formu-

lation of the body-mind problem, or such attempts may become superfluous.

BIBLIOGRAPHY

1. Abuel, J. I.: Über den Weg der von den Nervi pelvici geleiteten zentripetalen Erregungen im Rückenmark. *Ztschr. ges. exper. Med., 70:* 499–503, 1930.
2. Ashby, W. R.: *Design for a Brain.* New York: W. W. Norton & Co., 1952.
3. Bartley, S. H.: The features of optic nerve discharges underlying recurrent vision. *J. Exper. Psychol., 30:* 125–135, 1942.
4. Bergson, H.: *Mind-Energy.* Translated by W. Carr. New York: Henry Holt & Co., 1920.
5. Bernis, W. J., and Spiegel, E. A.: Die Zentren der statischen Innervation und ihre Beeinflussung durch Klein- und Grosshirn. *Arb. Neurol. Inst. Wien., 27:* 197–224, 1925.
6. Bishop, G. H.: Cyclic changes in excitability of the optic pathway of the rabbit. *Am. J. Physiol., 103:* 213–224, 1933.
7. Clark, W. E. Le Gros: The structure of the brain and the process of thinking. In *The Physical Basis of Mind.* Edited by P. Laslett. Oxford: B. Blackwell, 1950, pp. 12–24.
8. Cragg, B. G., and Temperley, H. N. V.: The organisation of neurones: A cooperative analogy. *Electroencephalog. & Clin. Neurophysiol., 6:* 85–92, 1954.
9. Cragg, B. G., and Temperley, H. N. V.: Memory: The analogy with ferromagnetic hysteresis. *Brain, 78:* 304–316, 1955.
10. Flechsig, P.: *Gehirn u. Seele,* 2nd Ed. Leipzig: Vogt, 1896.
11. Flechsig, P.: Zur Anatomie und Entwickelungsgeschichte der Leitungsbahnen im Grosshirn des Menschen. *Arch. Anat. u. Physiol. Anatomische Abt.,* pp. 12–78, 1881.
12. Forbes, A., and Morison, B. R.: Cortical response to sensory stimulation under deep barbiturate narcosis. *J. Neurophysiol., 2:* 112, 1939.
13. Freeman, W., and Watts, J. W.: Pain mechanisms and the frontal lobes. *Ann. Int. Med., 28:* 747, 1948.
14. Galambos, R.: Neural mechanisms of audition. *Physiol. Rev., 34:* 497–528, 1954.
15. Glees, P., and Griffith, H. B.: Bilateral destruction of hippocampus (cornu ammonis) in case of dementia. *Monatsschr. Psychiat. u. Neurol., 123:* 193–204, 1952.
16. Harrison, F.: An attempt to produce sleep by diencephalic stimulation. *J. Neurophysiol., 3:* 156, 1940.
17. Hess, W. R.: Das Schlafsyndrom als Folge dienzephaler Reizung. *Helvet. physiol. et pharmacol. Acta., 2:* 305, 1944.
18. Hunter, J., and Jasper, H.: Effects of thalamic stimulation. *Electroencephalog. & Clin. Neurophysiol., 1:* 305–324, 1949.
19. Karplus, J. P., and Kreidl, A.: Ein Beitrag zur Kenntnis der Schmerzleitung im Rückenmark. *Pflügers Arch. ges. Physiol., 158:* 275–286, 1914.
20. Karplus, J. P., and Kreidl, A.: Totalextirpation einer u. beider Grosshirnhemisphären bei Affen. *Arch. Anat. u. Physiol.* (Physiol. Abt.) pp. 155–212, 1914.
21. Kletzkin, M., and Spiegel, E. A.: Spinal pain conduction by chains of short neurons. *Fed. Proc., 11:* 83, 1952.
22. Kohnstamm: Quoted by Wallenberg.
23. Kuhlenbeck, H.: *Brain and Consciousness.* Basel-New York: S. Karger, 1957.
24. Lashley, K. S.: In search of the engram. Symposium. *Soc. Exper. Biol., 4:* 454–482, 1950.
25. Lilly, J. C., and Cherry, R.: Traveling waves of action and of recovery during responses and spontaneous activity in the cerebral cortex. *Am. J. Physiol., 167:* 806, 1951.
26. Lindsley, D. B.: Higher functions of the central nervous system. *Ann. Rev. Physiol., 17:* 311–336, 1955.
27. MacKay, D. M.: Some experiments on the perception of pattern modulated at the alpha frequency. *Electroencephalog. Clin. Neurophysiol., 5:* 559–562, 1953.
28. Magoun, H. W.: Caudal and cephalic influences of the brain stem reticular formation. *Physiol. Rev., 30:* 459–474, 1950.
29. Meyer, A., and Beck, E.: *Prefrontal Leukotomy.* Edinburgh: Oliver & Boyd, 1954.
30. Murphree, O. D.: Maximum rates of form perception and the alpha rhythm: An investigation and test of current nerve net theory. *J. Exper. Psychol., 48:* 57–61, 1953.
31. Papez, J. W.: A proposed mechanism of emotion. *Arch. Neurol. & Psychiat., 38:* 725, 1937.
32. Penfield, W., and Jasper, H.: *Epilepsy and the Functional Anatomy of the Human Brain.* Boston: Little, Brown & Co., 1954.
33. Peyton, W. *et al.*: Prefrontal lobectomy in schizophrenia. *Arch. Neurol. & Psychiat., 62:* 560, 1949.
34. Pitts, W., and McCulloch, W. S.: How do we know universals? The perception of auditory and visual forms. *Bull. Math. Biophysics, 9:* 127–147, 1947.
35. Pringle, J. W. S.: On the parallel between learning and evolution. *Behaviour, 3:* 1951.
36. Ranson, S. W.: Somnolence caused by hypothalamic lesions in the monkey. *Arch. Neurol. & Psychiat., 41:* 1–23, 1939.
37. Rashevsky, N.: The neural mechanism of logical thinking. *Bull. Math. Biophysics, 8:* 29–40, 1946.
38. Schiff, M.: Lehrbuch der Physiologie des Menschen. Lahr, 1858.
39. Schilder P., and Stengel, E.: Asymbolia for pain. *Arch. Neurol. & Psychiat., 25:* 598, 1932.
40. Smith, K. U., and Akelaitis, A. J.: Studies on the corpus callosum. I. Laterality in behavior and bilateral motor organization in man before and after section of the corpus callosum. *Arch. Neurol. & Psychiat., 47:* 519–543, 1942.
41. Spiegel, E. A.: Comparative study of the thalamic, cerebral and cerebellar potentials. *Am. J. Physiol., 118:* 569–579, 1937.
42. Spiegel, E. G., and Szekely, E. G.: Thalamic compensation of the loss of the hypothalamic "waking center". Fed. Proc., *14:* 143, 1955.
43. Spiegel, E. A., and Wycis, H. T.: Thalamic recording in man with special reference to seizure discharges. *Electroencephalog. Clin. Neurophysiol., 2:* 23–27, 1950.
44. Spiegel, E. A., and Wycis, H. T.: Mesencephalotomy in treatment of "intractable" facial pain. *Arch. Neurol. & Psychiat., 69:* 1–13, 1953.
45. Spiegel, E. A., and Wycis, H. T.: Physiological and psychological results of thalamotomy. *Proc. Royal Soc. Med., 42:* 84–92, 1949.
46. Spiegel, E. A., Wycis, H. T., Freed, H., and Orchinik, C.: The central mechanism of the emotions. (Experiences with circumscribed thalamic lesions.) *Am. J. Psychiat., 108:* 426–431, 1951.
47. Spiegel, E. A., and Bernis, W. J.: Beiträge zum

Studium des vegetativen Nervensystems. IX. Mitteilung. Die Rückenmarksbahn der Visceralsensibilität. *Pflügers Arch. ges. Physiol., 210:* 209–214, 1925.

48. Spiegel, E. A., and Inaba, C.: Experimentalstudien am Nervensystem. VII. Mitteilung. Zur zentralen Lokalisation von Störungen des Wachzustandes. *Ztschr. ges. exper. Med., 55:* 164–182, 1927.
49. Spiegel, E. A., and Kletzkin, M.: Spinal pain conduction by chains of short neurons. *Fed. Proc., 11:* 83, 1952.
50. Spiegel, E. A., Kletzkin, M., and Szekely, E. G.: Pain reactions upon stimulation of the tectum mesencephali. *J. Neuropath. & Exper. Neurol., 13:* 212–220, 1954.
51. Spiegel, E. A., Kletzkin, M., Szekely, E. G., and Wycis, H. T.: Role of hypothalamic mechanisms in thalamic pain. *Neurology, 4:* 739–751, 1954.
52. Spiegel, E. A., Miller, H. R., and Oppenheimer, M. J.: Forebrain and rage reactions. *J. Neurophysiol., 3:* 538–548, 1940.
53. Spiegel, E. A., Wycis, H. T., Orchinik, C. W., and Freed, H.: The thalamus and temporal orientation. *Science, 121:* 771–772, 1955.
54. Spiegel, E. A., Wycis, H. T., Orchinik, C., and Freed, H.: Thalamic chronotaraxis. *Am. J. Psychiat., 113:* 97–105, 1956.
55. Steiner, J.: Funktionen des Zentralnervensystems u. ihre Phylogenese. Braunschweig, 1898–1900.
56. Szekely, E. G., and Spiegel, E. A.: The effect of bulbocapnine upon the spontaneous electric activity of the brain and its reactivity to afferent stimuli. *Electroencephalog. Clin. & Neurophysiol., 6:* 213–219, 1954.
57. Walker, A. E.: Central representation of pain. In *Pain. Res. Publ. Ass. Nerv. Ment. Dis., 23:* 63–85, 1943.
58. Wallenberg, A.: Anatomie, Physiologie u. Pathologie des sensiblen Systems. *Verhandl. Gesellsch. Deutsch. Nervenärzte, 17:* 27–71, 1928.
59. Walter, W. G.: *The Living Brain.* New York: W. W. Norton & Co., 1953.
60. Walter, W. G., and Shipton, H. W.: A new toposcopic display system. *Electroencephalog. Neurophysiol., 3:* 281–292, 1951.
61. Wiener, N.: *Cybernetics.* New York: Wiley, 1948.

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EMOTION AS FRUSTRATIONAL BEHAVIOR[1, 2]

NINA BULL[3]

In this paper the *Attitude Theory of Emotion* and *Goal Orientation Theory*, which have been published separately (1, 2), will be reviewed briefly and brought together to form a basis for the further clarification of emotion—this time with regard to its genesis and scope.

Attitude Theory

First came the concept of a non-specific body-mind relationship, which was formulated in 1945 in an attempt to demonstrate a neuromuscular mechanism common to all emotion (3). According to this theory the feeling in emotion is generated by preparatory motor attitude held up from going into action. The concept was later published in a monograph as the Attitude Theory of Emotion (1). It has been supported by experimental and other evidence, and has been shown in its relation to the James-Lange theory and other varieties of the motor theory of consciousness. Because of the concentration on the body-mind relationship, there was no attempt in any of our published studies to pin emotion down by definition or to say what it should or should not include. In fact, the term was used in a very broad and general sense to cover *all* behavior where feeling is a factor. But we are now proposing to change this usage in favor of a more precise terminology, as having both practical and theoretical importance.

Goal Orientation Theory

In 1953 there was the formulation of a theory of purposeful behavior when it is oriented toward a goal. It is a matter for concern that there exists no term in general use, either popular or scientific, to describe the forward-facing, goal-directed attitude which is geared for flexibility while it subserves integrity of purpose, and thus prepares the individual for the most intelligent performance of which he or she is capable.

We have proposed *goal orientation* as the most appropriate term for this purposeful but non-emotional motor attitude which both prepares for forward movement and supports it.

The goal-directed attitude is an ancient forward-looking pattern of readiness for appetitive seeking and pursuing, and is designed to reach some definite objective essentially desirable and of biological importance to the organism. It is this objective that we are calling *goal*.

Our study of this type of integrated readiness, and especially of the neuromuscular mechanism (see following section) that underlies it, turned out to be the point of departure for a new interpretation of frustration, regarded as a complex of motor attitudes resulting from too much interference. In other words the interference brings about a breakdown of the goal-directed process, with its intermediate appetitive stage, and the consequent release of lower-level patterns of behavior, with their more immediate intent.

Into this picture of frustration, as a complex of motor attitudes, it is not difficult to fit the concept of emotion—a development which makes it possible to point up a distinction between two kinds of subjective experience which were not previously differentiated, namely the feelings in emotion and the feelings in purposeful behavior when this is oriented toward a goal. In accordance with this new distinction, feelings of *having an aim* and *making progress*, which characterize the continuity involved in striving toward a goal, should *not* be called emotion; whereas such feelings as anger, fear and sadness (self-pity), which result respectively from attitudes of readiness to attack, readiness to escape and readiness to cry, can very properly continue to be considered under the heading of emotional experience. These latter feelings are in truth "emergency reactions", as Cannon called them. They are hypothalamic in their origin and precipitate in character as contrasted with the

[1] From the New York State Psychiatric Institute, New York City. Project for the Study of Motor Attitudes.

[2] Published simultaneously in Revista de Psicología General y Aplicada Madrid, Spain.

[3] Director of Project.

step-by-step control and future reference evinced in the appetitive stage of goal-directed purpose.

This limitation of the concept of emotion does not affect the general principle of preparatory motor attitude as giving rise to feeling. It does, however, introduce and stress both a distinction and a relationship between goal orientation (attitude and feeling), on the one hand, and the various non-goal-oriented attitudes and feelings of emotion, on the other.

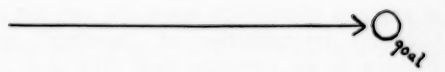

FIG. 1

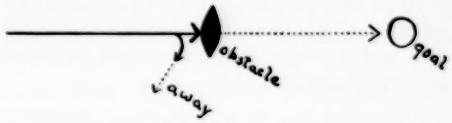

FIG. 2

THE MECHANISM OF GOAL ORIENTATION

In a previous paper (2), we have posited a neuromuscular mechanism in which binocular coordination combines with incipient locomotion to produce a state of readiness which enables the organism to carry out a short or long term course of action as needed to achieve the end in view.

The attitude in question is one of the innate patterns of vertebrate behavior—as are the attitudes that underlie emotion—and like these latter is set up in a reflex fashion, but on a higher level of nervous integration. Inasmuch as it is based on a symmetrical visuo-locomotor coordination, both forward-facing and prepared to go ahead, goal orientation can be traced far back in evolution to the positive tropisms which Loeb described and demonstrated in simple forms of animal life with their immobile eyes when it was advantageous for them to seek the light. Binocularity came on the scene with the development of vertebrates, whose mobile eyes were capable of moving independently and thus in need of being yoked together in order to orient the organism effectively in one direction. When reinforced by an olfactory orientation more ancient still, binocular coordination constitutes the natural steering apparatus for the pursuit of prey, and it was in this connection that the phenomenon was first described (6).

In developing the concept of goal orientation as a biological norm, the term frustration was adopted to describe what happens when the oriented organism encounters more obstruction than can be "taken in stride". This leads to an operational theory of frustration as based on a breakdown of the forward-facing attitude—a literal *dis*ruption being caused by *inter*ruption of the project (5). We have given evidence in earlier studies (2, 5, 8) of reasons for believing that the breakdown of binocularity is a basic factor in frustration and indicates a loss of one-directional orientation.

FRUSTRATION—THE BREAKDOWN OF THE MECHANISM

The accompanying diagrams (figs. 1–2) were used to illustrate what happens when progress toward the goal is interrupted by an obstacle whose impact is sufficient to produce disruption—that is to say, a split reaction, but not by any means a random one, nor wholly unpredictable.

In figure 2 a basic predicament is indicated, the organism maintaining to some extent its striving toward the goal, but in addition being now fixated on the obstacle, which is always nearer than the goal, looms larger—and requires to be dealt with first. Under these circumstances the interruption takes on the character of *danger*, and the two-directional tendency evoked by it is (a) *at* the obstacle, preparatory to attack it, and (b) *from* the obstacle, preparatory for escape. In short, we find in all frustration two mutually obstructive attitudes that underlie the feelings of anger and fear, respectively, both of them aimed at riddance of the obstacle.

Thus frustration is in a sense the mother of these two emotions—including, as it always does, a fear of interference, and an anger at obstruction. These are the most familiar forms of "negative" (unpleasant) emotion, and actually the only ones that Cannon was considering in his famous concept of "emergency".[4] Recognition of the extremely primitive nature

[4] In the lesser degrees of disruption these emotions are found as irritability or mild annoyance, and do not necessarily prevent the individual from carrying on so long as the goal is "held in mind".

of anger at obstruction opens the way for a biological interpretation of "hostility" as *riddance in its aggressive form*. The goal is (temporarily at least) forgotten, while the obstacle becomes the center of attention as a *target for attack*. Thus the distinction between a goal and a target is crucial in all problems involving value.

Frustration and Other Emotions

Fear and anger are not, however, the only unpleasant emotions that are generated by frustration. Closely bound up with them is the emotion of disgust, in which the threat of being sick communicated through preparatory attitude is used to discourage the intruder and to push away all interference (actual and potential) with our way of life. This type of threat-reaction is frequently successful—but at a price the extent of which we have barely begun to realize. It is one of the most effective ways of keeping human beings apart from one another, and of preventing good relationships. The attitudes of scorn, contempt and arrogance are built around disgust-reactions, as Darwin was the first to note (7). They are intended to get rid of something that interferes with us, something we cannot "take" and which we accordingly consider "disagreeable".

There is one other basic form of riddance which is found in combination with the three we have just been considering (anger, fear, disgust), namely regression to the infant cry-for-help in one of its many muted (and socially permitted) forms. The helplessness experienced as a result of primary frustration slips over into some form of readiness for crying, usually frozen, as a kind of inner weeping, in the preparatory stage of motor attitude, to *register distress*. When this response predominates, we find frustration passing to its secondary stage, namely *depression*, with crying imminent but for the most part carefully suppressed. This attitude of self-fixation (which is primarily fixation on distress) can perseverate indefinitely as a deploring[5] tendency, always inviting help and sympathy, and never actually knowing what it wants. Crying is thus a bid for riddance, i.e., deliverance from trouble (which is a common name for interference) where someone else is asked, or rather expected, to take over.

There is no one single name for this extremely prevalent type of feeling, which variously appears as sadness, grief and sorrow, complaint, a sense of tragedy, self-pity and the like; but we submit that all these "sorry" feelings (called emotions only when they are uncomplicated and fairly strong) have a common root—the attitude of muted crying—and that fixation on some trouble-making interruption is the (conscious or unconscious) cause of it.

The primary attitudes of anger, fear, disgust and crying appear most commonly in combination and yield a harvest of unpleasant secondary feelings such as jealousy and hate, resentment, guilt and horror. These compounds are potential factors in the feelings of inferiority and persecution, and other forms of *complex*, where success, pleasure and/or comfort are blindly and ineptly sought to mitigate the sense of stress inherent in frustration, but prove—at best—to be only a temporary respite.

The various sequences in which frustrational behavior leads to fresh frustration are a matter for future study, and we are only touching on it here to point up a natural link between *un*pleasant emotions, based on conflicting efforts to be rid of trouble, and *pleasant* ones, based on the elation that comes with the desired riddance. However, when the release from stress is sudden or occurs through agencies that seem mysterious because they are not understood, the feeling of elation seems to be unconnected with any antecedent trouble, and is felt as simply "joyful" rather than "triumphant". These rather fine distinctions and relationships were brought out in a series of experiments where specific emotions (including triumph and joy) were produced in hypnotic subjects (4). When the emotion had subsided, the subjects, while still in trance, were able to give a detailed report of their experience, which was correlated afterward with shifts in motor attitude as noted in their postural and facial changes. This material on emotion has been published in this journal (4) and as a chapter in the author's monograph (1).

The point we are making here is simply this: triumph and joy, in all their variations, are

[5] From the Latin *plorare*, to cry.

actually born of trouble and represent a liberation from frustration and depression, being the successful culmination of the emergency sequence. They are, in fact, the terminal stage of the emergency. As such, they are essentially non-goal-oriented, temporary, and tend to spend themselves in celebration and communication. The neural centers responsible for such performance have never been determined, so far as we are aware, but they are presumably not too far removed from the hypothalamic area.

Of special practical significance in this connection is the fact that while unpleasant emotions are sometimes agreeably replaced by pleasant ones through chance or some device, this shift *per se* does not suffice to solve the basic problem of dealing with obstruction, nor does it usually help reorient the organism toward its goal. States of elation—even in their milder form of "satisfaction"—are normally short-lived, and too much lingering in the pleasant state of self-congratulation makes it hard to start again on any goal-oriented path.

A Further Limitation of the Concept of Emotion

We have stressed the point that emotion belongs in a different category from goal-oriented feeling and behavior. Before closing our paper, we must touch on the obvious fact that breakdown behavior does not always manifest as emotion by any means. All kinds of fragmentation of instinctive patterns can and do occur; and the forms of compulsive and suppressive behavior, some of which we have touched on in previous studies, are practically limitless in number. According to our concept of the generative role of attitude, some such motor patterns will be found supporting the disturbed imaginations and verbalizations that characterize mental confusion and indicate that the sense of direction has to a greater or less extent been lost.

As for emotion that is sufficiently clear-cut to be definitive, it only appears when none of the motor responses automatically aroused by interference is carried out in full, *while at the same time* some one response emerges as a predominating motor attitude, and thus gives rise to more or less distinguishable feeling. Most of the time the feelings mix and blur—anger and fear, disgust and sorriness, interspersed with elements of triumph in the form of pride—and shift in a kaleidoscopic fashion, being the proprioceptive and enteroceptive feedback from a series of complex attitudinal attempts at extrication from the complex of frustration.

In short most of the feeling-states engendered by disruption of goal-oriented purpose are not clear-cut at all, so that emotion can be thought of as *one* of the forms—but definitely not the only form—of frustrational behavior.

We have written of frustration as the breakdown of goal-oriented purpose, for it is in this connection that the pattern of the complex can most readily be grasped. But there are innumerable purposes that never reach goal-oriented status, where impulses arise and hopes are raised and dashed but goals, as we conceive the term, are not envisaged. Here, in the partly oriented attitudes, and feelings of incapacity and deprivation, we find frustration appearing first in its depressional phase, in which case the motor patterns are overlapping and too confused to rate as recognizable emotion.

There are, however, certain types of emotion that represent emergence from depression, and these are cultivated by the human race in all parts of the world as aspects of religion and art. These cultural patterns will be considered in a future study, in the light of their biological value—therapeutic and socializing—to the individual and to the race.

Summary and Conclusion

In the foregoing pages we have brought the concepts of Goal Orientation and Frustration together with the Attitude Theory of Emotion.

In addition to some expansion of earlier material, a new thesis is introduced which limits the concept of emotion and differentiates it from goal-oriented purpose by positing its dependence on *interruption*. Thus an over-all behavior sequence, not previously noted, becomes apparent and includes (a) *goal-oriented purpose*, (b) *its breakdown as frustration*, and (c) those elementary and fairly clear-cut patterns of attitude and feeling that stem from breakdown and are commonly referred to as *emotion*.

Since Attitude Theory, which was originally

formulated for clarifying emotion, supplies a physiological substrate for feeling in general, it should no longer be associated specifically with emotion. Its applicability to *all* behavior, where feeling in Coghill's sense of "elementary mentation" is a factor, cannot be stressed too often.

The three main patterns of behavior here presented as a sequence—Goal Orientation, Frustration and Emotion—are outstanding examples of this generic body-mind relationship which is the core of Attitude Theory. The sequence itself and the relations between the patterns that compose it are offered as a contribution toward a set of human values that rest on neurobiological principles.

BIBLIOGRAPHY

1. Bull, N.: *The Attitude Theory of Emotion*. New York: Nerv. and Ment. Dis. Monograph No. 81, 1951. Now distributed by The Williams and Wilkins Company, Baltimore.
2. Bull, N.: The mechanism of goal orientation and the manner of its disruption. *J. Nerv. & Ment. Dis., 122:* 42, 1955.
3. Bull, N.: Towards a clarification of the concept of emotion. *Psychosom. Med., 7:* 210, 1945.
4. Bull, N., and Gidro-Frank, L.: Emotions induced and studied in hypnotic subjects. II. The findings. *J. Nerv. & Ment. Dis., 112:* 97, 1950.
5. Bull, N., and Strongin, E.: The complex of frustration—a new interpretation. *J. Nerv. & Ment. Dis., 123:* 531, 1956.
6. Chavasse, F. B.: Section I, The Foundations of Binocular Reactions. In *Worth's Squint*, Ed. 7. Philadelphia: P. Blakiston's Son and Company, 1939.
7. Darwin, C.: *The Expression of the Emotions in Man and Animals*. New York: D. Appleton-Century Company, 1920.
8. Strongin, E. I., Strongin, J., and Bull, N.: Visual changes and affective states. *J. Nerv. & Ment. Dis., 119:* 344, 1954.

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LOSSES AND DEPRESSION

The Relationship of Precipitating Events to Outcome[1]

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Events in a person's life history have been thought to produce or contribute to mental illness. We suggest that a relationship between life history and mental illness would be demonstrated if events in the history were shown to have an effect on the duration or outcome of the illness. A predictable relationship between certain stresses and certain outcomes would be evidence of this effect. The particular stresses studied here are the immediate events thought to have precipitated onset or increase of symptoms. By investigating the relationship of these events to outcome we have sought to measure their importance in different mental diseases. This approach is, of course, only one method of evaluating causes of mental illness.

Subjects and Methods

Subjects were 128 consecutive in-patients of the Massachusetts Mental Health Center, Boston Psychopathic Hospital, receiving electric shock treatment. The data on 117 are available; follow-ups of the others have not been possible.

The writer's diagnosis of each patient was based on an interview before electric shock treatment and the resident's clinical impression. This diagnosis is the one used to group patients in the subsequent analysis. Schizophrenia was diagnosed in the presence of dissociative phenomena, autistic signs, or flattened or inappropriate affect. Patients presenting both schizophrenic symptoms and mood disturbances suggestive of affective illnesses were classified as schizo-affective psychoses or involutional paranoid depressions. Of the 117 patients there were 86 affective disorders, including involutional depressions, involutional agitated depressions, psychotic and neurotic depressive reactions (reactive depressions), manic-depressive psychoses of both manic and depressive types, and involutional paranoid depressions. The 8 schizo-affective patients were grouped with 16 schizophrenics. Three patients had neuroses other than reactive depressions, and two had chronic brain syndromes.

What is meant here by "precipitating factor" is the event or events which the resident believed immediately responsible for the patient's admission clinical state. These statements were secured in two ways: each resident was interviewed concerning each patient and the resident's admission written formulation searched for statements about precipitating factors. No precipitating factors were given in 13 cases, five among the affective disorders, five among the schizophrenics, two neurotics, and one patient with a chronic brain syndrome. Since the question of loss or death of close relatives was considered particularly important, a thorough search for all such losses was made, by checking charts and by the writer's questioning of relatives, with emphasis on those occurring within two years before the patient's admission. By close relatives is meant those immediately related to the patient: father, mother (including step and foster parents), spouse, siblings, and children.

The subjects were again interviewed by the writer within two weeks after completion of the course of electric shock treatment and the resident's description of any changes in the patient's psychological or environmental status noted. Six months after the completion of electric shock treatment each patient's condition was re-investigated. These data were collected by two or more of the following methods: interviewing the patient (in person or by telephone), speaking to relatives or the patient's doctor, and by examining hospital records. An attempt was made to verify data by seeking reports from different sources. The information sought included amounts of intervening hospitalization or other treatment,

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TABLE 1.—NUMBERS OF PATIENTS IN EACH OUTCOME GROUP AND THE PERCENTAGE OF EACH GROUP EXPERIENCING LOSSES OF IMMEDIATE RELATIVES WITHIN TWO YEARS OF ADMISSION

	Outcome Groups								Totals
	I (Still hospitalized or re-hospitalized)		II (Discharged but not working)		III (Discharged and working part-time)		IV (Discharged and working full-time)		
	Totals	% with loss of immediate relatives	Totals	% with loss of immediate relatives	Totals	% with loss of immediate relatives	Totals	% with loss of immediate relatives	
Affective disorders	19	58	13	39	13	23	41	15	86
Schizophrenic and schizo-affective disorders	13	15	2	0	3	0	8	25	26
Neuroses	2	0	1	0					3
Chronic brain syndromes	2								2
Totals (all diagnoses)	36	39	16	31	16	19	49	16	117

work and housework status, and any changes in the factors originally thought to have precipitated the patient's admission clinical state. On the basis of these data the patients were arranged in four "Outcome Groups".

I. Hospitalized throughout the six months after completion of electric shock treatment or re-hospitalized during the follow-up period;

II. At home and not re-hospitalized by the end of six months, but not working outside the home or even inside it;

III. Not re-hospitalized in the 6-month period and working part-time outside the home or doing a single-person's housework inside it or both;

IV. Full-time work or care of a family home by the end of six months.

Part-time work spans wide differences in expenditure of time and energy; nothing more is meant by it here than less than full-time work and more than no work at all.

All the patients who were discharged and not re-hospitalized (Groups II, III, and IV) were discharged within one month after electric shock treatment with three exceptions: two patients remained hospitalized two months after electric shock treatment and one patient four months. Patients re-admitted and re-treated with electric shock treatment were not included in the study group a second time.

Twenty patients with affective illnesses were given Funkenstein Tests before electric shock treatment. The testing and grouping procedures have been described elsewhere (3).

Before investigating the 6-month status of the last 49 patients treated, a prediction of outcome was made for each, on the basis of the known outcome of the preceding group of patients. These predictions were made by matching the precipitating factors of the last 49 patients with the precipitating factors of the previous 68 patients, whose 6-month statuses were already known.

RESULTS

Table 1 presents the data on numbers of patients in each Outcome Group and the percentage losing immediate relatives within two years of admission, for each diagnostic classification. The table shows that the largest percentage of losses of immediate relatives occurred among the affective patients with the less favorable outcomes. This relationship between losses of immediate relatives and outcome is not seen with the schizophrenic patients. In the following sections each diagnostic category is separately discussed.

Affective Disorders

Outcome Group I (19 patients): Eleven, or 58 per cent, of the patients still hospitalized or re-hospitalized by the end of the 6-month follow-up period had experienced loss of immediate relatives within a year and a half before admission:

> Separation or divorce from husband or wife within the year before admission (three), or the death of father, mother, husband or last living immediate relative within a year and a half (eight).

The immediate relatives of two other patients were seriously ill:

One patient's father had a cerebral vascular accident six months before the patient's admission, and the son of another was diagnosed schizophrenic within six weeks of the patient's admission.

The precipitating factors listed for the remaining six patients appeared to be of less severity:

Loss of a job held forty-five years, birth of a child two years before admission and husband's change of career, return of a husband after twelve months of hospitalization for tuberculosis, change in a husband's attitude toward one patient, her children's demand on another patient to give up a boy friend, and a husband's being delayed one evening in a snowstorm.

Five of these last six patients, who had experienced apparently less severe precipitating events, showed clinical features not found in the other patients of Group I: two were involutional paranoid depressions, one was a chronic alcoholic, and two had very severe hypochondriasis. In addition, these six patients spent an average period of four months outside the hospital during the 6-month follow-up period in contrast to an average period of 1.8 months outside the hospital for the first 13.

Outcome Group II (13 patients): Among subjects not re-hospitalized but essentially invalided at home after six months, five, or 39 per cent, lost by death or divorce an immediate relative:

Two patients lost spouses by divorce and three others lost a father, foster mother, and stepfather by death. All these losses were within two years of admission.

A sixth patient lost her husband within three years of admission. All but one of these losses were mentioned as precipitating factors by the residents, as all such losses had been in Group I.

The losses had occurred within three years of admission, compared with one and a half years for the patients in Group I. Also, there were losses of step and foster parents in this Group, while the parental losses in Group I had all been of blood relatives.

The remaining patients in Group II had been ill, recently retired, or separated from an immediate relative:

The mother of one patient had a recent diagnosis of cancer, two subjects experienced coronary infarction one and two years before admission, two others retired from jobs held 25 and 30 years. Another was diagnosed hypertensive, and the last was separated from a daughter because of the latter's marriage.

There were no paranoid patients and one severely hypochondriacal, whose precipitating factor was a coronary two years before.

Outcome Group III (13 patients): Of the subjects working part-time after six months, three, or 23 per cent, had lost, all by death, a mother, wife or sibling within two years. Precipitating factors for the remaining 10 included a variety of events:

Threat of a wife to leave, operation or hospitalization of a daughter (two), separation from roommate or friend (two), therapist on vacation, impotence following surgery, refusal of a patient's offer of marriage, criticism of a patient's housekeeping; no precipitating factor was determined for one patient.

The patient for whose illness no precipitating factor was determined showed severe hypochondriasis. There was one paranoid involutional state in the group; criticism of her housekeeping was the event said to have precipitated her illness. As noted in Outcome Group I, the patients with severe hypochondriasis or paranoid ideation had experienced precipitating events which were more often apparently trivial or undetected than was the fact in depressions without these clinical features.

Of the three patients losing immediate relatives, two received electric shock treatment on an out-patient basis during the follow-up period, which may have played a part in their having remained outside the hospital. It may also be significant that the third patient, who had lost his wife, became engaged during the six months.

Outcome Group IV (41 patients): Of the 41 patients working full-time at the end of the follow-up period, losses of immediate relatives within two years were thought to be the precipitating events in two cases. Both patients lost husbands: one by death, the other by separation. Both received out-patient electric shock treatment in the follow-up period. Search of the charts and the writer's questioning of relatives disclosed four additional patients who had lost mother or father or both within two years of admission. These losses had not been considered precipitating events by the resi-

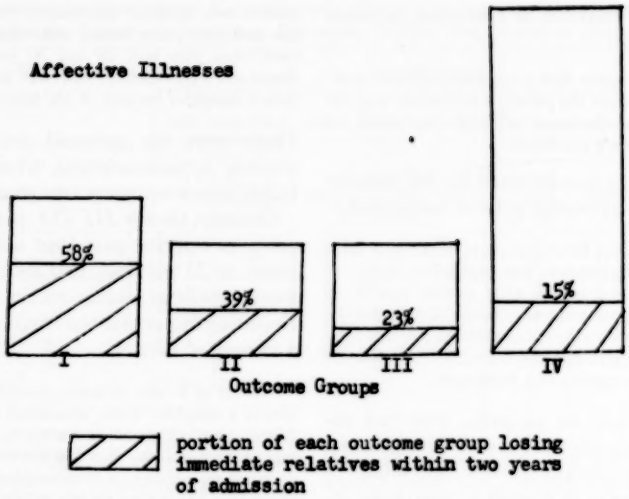

FIG. 1. Distribution of losses of immediate relatives among outcome groups in the affective illnesses.

dents. These six patients comprised 15 per cent of Outcome Group IV.

Three other deaths were considered to have been precipitating factors: death of a brother five years before admission, of a father four years before admission, and of the mother of the patient's employer three years before admission. These losses were less recent than similar losses which precipitated illnesses with unfavorable outcomes.

The remaining precipitating factors are given below. In a number of cases individual patients experienced more than one of these events.

Four patients had been ill, with gastrointestinal bleeding, anemia, or loss of sight in one eye; the fourth was told of heart disease two and a half years before. The immediate relatives of six other patients had been ill with cancer, heart attacks, or complications of pregnancy.

Fifteen patients had work difficulties: added duties, loss of jobs or depression of business.

For two patients the stresses named were temporary separation from husbands, because of Naval training in one case and additional working hours in the other.

In seven cases events happening to the patients' daughters were thought to have been the precipitating factors: their pregnancies, marriage, or starting to go on dates.

Other precipitating factors, for 14 subjects, included vacations, therapists' vacations, recent marriage, menopause, new baby, children leaving home, and a wife threatening to leave home. No precipitating factors were noted in four cases.

None of the patients in this Group was paranoid, and only one was severely hypochondriacal.

Figure 1 presents graphically the total number of affective patients and the percentage losing immediate relatives, within two years of admission, in each of the Outcome Groups. By chi-square calculations the distribution of losses of immediate relatives has significance below the .01 level of chance.

Schizophrenia

Of the 13 schizophrenic and schizo-affective patients in Outcome Group I, two, or 15 per cent, had lost immediate relatives within two years. Loss of a father five years before admission was given as the precipitating event for a third patient. There were eight patients in Group IV, and of these, two, or 25 per cent, had lost immediate relatives. For a third patient the precipitating event was loss of a brother six years before. Table 1 presents the data for all Outcome Groups.

Four of the six patients in this diagnostic category who lost relatives were schizo-affective. This suggests that there is a relationship between important losses and the presence of affective features in a schizophrenic illness.

Among the schizophrenic and schizo-affective subjects there was a considerable number for whom no precipitating factors were

listed, five of the 26. This is in contrast to what was found for the affective illnesses in which apparently significant precipitating factors were almost always obvious.

All Diagnoses

Immediate family losses within two years before admission are given for all diagnoses, including neuroses and chronic brain syndromes, at the bottom of table 1. This distribution has no significance below the 10 per cent level of chance, even though the distribution of these losses in the affective illnesses does have statistical significance.

Effect of Changes in Precipitating Factors on the Course of Affective Disorders

An effort was made to determine what changes had taken place in relation to each precipitating factor by the end of the follow-up period. We wanted to know what effect, if any, such changes had on outcome. Note was kept of which factors were wholly or partly relieved. Classification was often difficult and arbitrary, as in calling engagement to remarry after loss of a spouse partial or complete relief of the precipitating factor. Reversal of one of a number of factors listed as having precipitated illness was classified as partial relief. Table 2 gives the number of cases in each Outcome Group showing relief or no relief of precipitating factors.

It is evident that patients whose illnesses had the more favorable outcomes experienced more frequent relief of precipitating factors than did patients whose illnesses had less favorable outcomes.

Results of Prediction of Outcome of Affective and Schizophrenic Illnesses

Before the follow-up results were known for the last 49 patients, an effort was made to match these patients, on the basis of the precipitating factors, with the earlier subjects whose outcomes were already known. In those cases in which matches could be made, the corresponding Outcome Group was predicted for the patients whose outcomes were not yet known. In many cases no exact equivalent match was found and an approximate one sought. Where no match could be made, the prediction was left in question. Results for the affective and schizophrenic disorders are given in table 3.

The actual Outcome Groups were correctly predicted for 20 of the 36 affective illnesses for which predictions were made. In 11 other cases the predictions were correct within one Outcome Group. In 31 of the 36 cases it was possible to predict from knowledge of the precipitating factors whether or not the patients would remain hospitalized or be re-hospitalized during the 6-month follow-up period.

Three patients with affective disorders for whom full-time work was predicted instead remained hospitalized or were re-hospitalized (Actual Outcome in Group I). Two had been severely hypochondriacal. The third patient was re-hospitalized four days before the 6-month period was up!

A Group I status (hospitalized or re-hospitalized) was predicted for two patients who at six months were actually working full- or part-time. One had received out-patient electric shock treatment in the follow-up period. The other became engaged to be remarried; the event thought to have precipitated his illness was the death of his wife.

The failure of this method to predict out-

TABLE 2

	Outcome Groups			
	I	II	III	IV
Partial or complete relief	0	2	7	28
No relief	17	11	6	10
?	2	0	0	3

TABLE 3

		Actual Outcome (Nos.)	Predicted Outcome (Nos. in Each Group)				?
			I	II	III	IV	
Affective illnesses							
Actual Outcome Group	I	10	6	0	0	3	1
	II	2	0	0	2	0	0
	III	8	1	0	1	5	1
	IV	18	1	0	4	13	0
Schizophrenic & Schizo-affective							
Actual Outcome Group	I	7	1	0	1	5	0
	III & IV	4	1	0	0	2	2

come in schizophrenic illnesses is apparent from the table.

Relation of Outcome to Factors Other Than Precipitating Events

Average Ages and Numbers of Treatments

Table 4 gives the average ages and average numbers of electric shock treatments for each Outcome Group among the affective illnesses. The greater average ages of patients in Groups II and III than in Groups I and IV suggest that retirement or physical infirmity may be affecting the outcome in these older patients.

Immediate Improvement after Electric Shock Treatment

To what extent is the patient's immediate response to electric shock treatment predictive of the outcome at six months? Table 5 compares degree of patient improvement within two weeks after the end of treatment for the affective illnesses with the outcome at six months. Zero means not improved, 1+ little improved, 2+ moderately improved and 3+ very much improved. The number of patients showing each degree of improvement is listed opposite the Outcome Group. Each patient's score is a composite of the resident's, patient's and the writer's impressions.

These data (based on subjective estimates of improvement) suggest that there is little correspondence between immediate and later outcomes. Patients appear to differ less in their abilities to respond to treatment than they differ in their abilities to hold these gains six months. Some of the data given earlier suggested a relationship between relief of precipitating factors and improved outcome. Those data together with the present ones suggest a further relationship, between relief of precipitating factors and maintenance of improvement: those patients who held their gains were also the ones who experienced the most frequent relief of precipitating factors.

TABLE 4

Outcome Group	Average Ages	Number of EST
I	46	10.3
II	55	12.4
III	57	12.8
IV	46	10.8

TABLE 5

		Amount of Improvement as Determined within 2 Weeks after End of EST			
		0	1+	2+	3+
Outcome Group	I	1	7	6	5
	II	1	2	6	4
	III	1	2	9	1
	IV	0	10	19	12

Marital Status

The availability of relatives or friends to care for patients at home often determines whether or not discharge is possible. Married mental patients, for example, are reported to have higher discharge rates than unmarried ones (8). The percentage of patients in each Outcome Group with spouse living and not separated or divorced is given below. These figures include only affective illnesses.

Group I	42%
Group II	54%
Group III	39%
Group IV	59%

This degree of variation is not statistically significant. Therefore, differences in marital status cannot account for the differences in discharge rates in this population.

Type of Treatment During the Follow-up Period

The search for other factors influencing outcome prompted review of treatment experiences in the follow-up period. Table 6 gives the percentage of patients with affective disorders receiving psychotherapy. Psychotherapy is here defined to mean contact of at least one-half hour's duration more frequent than once a month for at least three months, with doctor or social worker.

These differences are not statistically significant.

Among the schizophrenic patients in Groups II, III and IV there was a consistent average of more psychotherapy, as defined above, than among the schizophrenic patients in Group I, but the number of cases is small.

Eleven patients received out-patient electric shock treatment in the follow-up period. None was re-hospitalized; one was in Outcome

Group II; three in Group III; and seven in Group IV.

Results of Funkenstein Tests before EST

Twenty patients with affective illnesses were given Funkenstein Tests before electric shock treatment. This test depends on the blood pressure and subjective psychological changes following intramuscular mecholyl and intravenous epinephrine. Ten of the resulting blood pressure curves were characteristic of Funkenstein Group III (moderate or slight fall in systolic blood pressure after mecholyl with return to and maintenance of pre-injection level of blood pressure within the 25-minute observation period; rise in systolic blood pressure after epinephrine in excess of 50 mm. Hg), and ten others characteristic of Funkenstein Group VI (fall in systolic blood pressure after mecholyl with failure to reach pre-injection blood pressure level within the 25-minute observation period; rise in systolic blood pressure after epinephrine in excess of 50 mm. Hg). Patients with curves of the Group VI type are reported to respond more favorably to electric shock treatment than patients with curves of the Group III type (3).

Of the 10 patients with Group III curves five remained hospitalized or were re-hospitalized during the follow-up period. All had lost immediate relatives within one and one-half years of admission. They spent an average of 55 days in the hospital during the six months after electric shock treatment. The other five patients of the 10 with Group III curves all were working full- or part-time six months after electric shock treatment. There were no losses of immediate relatives among these five patients, and the average time spent in the hospital was six days.

Ten patients with affective disorders had Group VI curves. None remained hospitalized or was re-hospitalized. Two had lost immediate relatives within two years of admission, though these losses were not mentioned by the residents as precipitating factors.

The outcome for patients with Group III curves appeared to depend on whether or not they had experienced recent family losses. The patients with Group VI curves had favorable outcomes whether or not there had been losses of immediate family members.

TABLE 6

	Percentage of Affective Patients Receiving Psychotherapy
Group I	37
Group II	8
Group III	31
Group IV	24

Discussion

The results of this study suggest that the events felt to have precipitated patients' admission clinical statuses influence significantly the outcome of affective illnesses. Recent losses of immediate relatives were more frequent among patients still hospitalized or re-hospitalized at six months than among patients who remained discharged, and more frequent among those discharged but not working than among those discharged and working. These losses had been more recent in the group still hospitalized or re-hospitalized than in the groups of discharged patients. Patients who did not demonstrate these relationships differed in several respects from those who did. The patients in Outcome Group I (still hospitalized or re-hospitalized) who had experienced no apparently severe losses had shorter periods of re-hospitalization than the other patients in the same Outcome Group. They also showed certain clinical features, severe hypochondriasis and paranoid ideation, not found in other patients of Group I. Some patients in Outcome Groups III and IV (discharged and working) experienced losses of immediate relatives; in four of the five cases in which these losses were cited as precipitating factors, the patients had received out-patient electric shock treatment by the end of six months. The outpatient EST may have played a part in their having remained outside the hospital and working.

These relationships were not found among the few patients diagnosed schizophrenic and were shown in the affective illnesses to make possible successful prediction of outcome in the majority of cases.

Where losses were replaced or stressful conditions remedied, the prognosis was significantly improved. Because some kinds of losses were not replaced, we are unable to determine whether it is the particular precipitating factor

or some change in the precipitating factor, occurring during the illness or follow-up period, which chiefly affects outcome.

We cannot say whether the events classified here as losses were experienced as such by the patients themselves, as there are insufficient data available on the meaning of these events to the patients involved.

The opinion has been expressed that electric shock treatment is more effective with some types of depression than with others. "Endogenous" depressions are commonly said to be more responsive to electric shock treatment than are "reactive" depressions. In this study patients experiencing minor precipitating events or no detectable precipitating events had more favorable courses after electric shock treatment than did patients who had experienced more severe stresses. This raises the question whether the relationship noted here between certain precipitating factors and outcome is a result of the electric shock treatment.

A relevant investigation of this question by Hunt (5), before the introduction of electric shock treatment, demonstrated that the duration of manic-depressive illness was similar whether or not serious precipitating factors had occurred, provided these factors were relieved. The duration of illness was considerably longer if no change had occurred in the precipitating factors.

There are other reasons for doubting that the differences in outcome of the illnesses studied here are a result of differences in the effectiveness of electric shock treatment in the various types of depression. Most affective illnesses showed some immediate response to electric shock treatment; differences were more apparent in the degree to which improvement was sustained. Although diagnoses of reactive depression were made for illnesses following a variety of precipitating events, outcome proved to be more a result of what was reacted to than whether or not there had appeared to be a reactive element in the depression.

The results of this study may seem surprising in view of the common opinion that obvious precipitating events in a mental illness are a favorable prognostic sign. Studies of prognosis in schizophrenia have repeatedly supported this opinion (2, 4). The present work suggests that it is not true of affective disorders. While illnesses with schizophrenic features were not commonly preceded by losses, and the outcome of the schizophrenic illnesses did not depend on the type of loss, affective disorders appeared to be reactions to the events that precipitated them, most of which were losses. The purer the affective reaction the more its outcome depended on the type of loss.

Strecker and associates (7) have reported data supporting a different conclusion from ours: that environmental stresses are more frequent in the recovered cases of manic-depressive disease than in the unrecovered cases. These workers did not attempt to distinguish types of stresses, and their material differed in two important respects from ours. Paranoid delusions were present in almost half their patients, and the majority of these delusions were in the unrecovered group. It has been emphasized here that in the presence of paranoid trends the relationship between certain precipitating factors and outcome does not appear. In addition, the follow-up period of the Strecker study was considerably longer than that of the present work, which is largely concerned with single episodes of depression. Only a period of follow-up comparable to the Strecker work will demonstrate whether or not the outcome at six months is a reliable index to the outcome at a later date. It may be that the patient who is sick at six months after loss of an immediate family member is well at five years, while another patient suffers shorter but more frequent illnesses after a variety of apparently less severe stresses. The present study says nothing about who is susceptible to depression.

Whatever the outcome at six months, almost all the depressions studied here were at least temporarily and partly improved after electric shock treatment. Holding this improvement was associated in many cases with some change in the precipitating conditions. Some recent animal work using electric shock treatment presents an interesting parallel to these results. Brady (1), working on conditioned behavior in animals, has noted that some "learned" behavior ("conditioned emotional response") is eliminated by electric shock treatment but that the elimination is often temporary. The animals' experience after electric shock treatment affects whether

or not the behavior returns. The behavior in many cases does return unless the animals enter a "learning" situation which differs in one respect from that in which the behavior first developed. The experience is similar in that the original first stimulus is again given but different in that the painful stimulus which had been given following the first stimulus is omitted. This suggests a comparison with our material; unless patients return to environments in which the original precipitating conditions (perhaps comparable to the painful stimulus) have changed, their affective illnesses will in many cases return. This conclusion is supported by a study Moss and Hamilton (6) made of attempted suicide. They reported that patients who returned to conditions similar to the setting in which they had attempted suicide showed higher rates of subsequent suicidal attempts than did patients returning to changed circumstances.

It is a common clinical impression that electric shock treatment serves to shorten depressive episodes but that it does not affect the rate of relapse. The considerations discussed above corroborate the impression that the rate of relapse does not depend on the electric shock treatment, but suggest essentially that relapse depends on the extent to which the precipitating factors are still active in the patients' environments.

Study of the results of the Funkenstein Tests given 20 patients before electric shock treatment demonstrated the effectiveness of the combined use of the Funkenstein Test results and of knowledge of the precipitating factors in predicting outcome. In our small sample it appeared that one test served to correct the deficiencies of the other.

It is hoped that this study will encourage other efforts to weigh the importance of various events and conditions of patients' lives on the scale of their subsequent histories. Dynamic psychiatry in its attention to the special meanings which events have for individuals may be, like the microscopic anatomist, in need of occasional orientation by such gross techniques as have been employed here. In the past, correlations have chiefly been sought, as by Kraepelin, between features of clinical psychopathology and prognosis. The Meyerian history promises to provide a deeper source of understandings. A search for correlations between common environmental constellations and the course of illness may expose problems to examination by finer techniques than these and provide some fresh assurance that the problems examined are the significant ones.

Summary

We have concluded that the life events thought to have precipitated affective illness significantly influence the outcome of the illness. These events were usually felt to be losses, and the outcome appeared to depend on the type of loss. The greater the extent to which affective reactions were free of schizophrenic and hypochondriacal features, the more consistently these relationships appeared. They were not seen in the schizophrenic illnesses studied.

In the affective illnesses losses of immediate relatives within two years before admission were significantly more frequent among patients with unfavorable outcomes than among patients with favorable outcomes, six months after electric shock treatment. There was also a correlation between changes from the precipitating conditions and improved outcome. Furthermore, the data suggested that continuance of the precipitating conditions was associated with a higher rate of relapse.

Knowledge of the precipitating events yielded a correct prediction of outcome in the majority of the affective illnesses for which outcomes were predicted. Combining the results of Funkenstein Tests with the findings about precipitating events produces a significantly higher proportion of correct predictions than is possible with either method alone. It is probable that combining the three factors, precipitating events, changes in the precipitating events, and the Funkenstein Test results, will yield a highly reliable prognosis in cases of depression.

BIBLIOGRAPHY

1. Brady, J. V., and Hunt, H. F.: An experimental approach to the analysis of emotional behavior. *J. Psychol., 40:* 313–324, 1955.
2. Chase, L. S., and Silverman, S.: Analysis of criteria in 150 schizophrenics treated with metrazol or insulin. *J. Nerv. & Ment. Dis., 98:* 464–473, 1943.
3. Funkenstein, D. H., Greenblatt, M., and Solomon,

H. C.: *Prognostic Tests Indicating the Effectiveness of Treatment*. A. Res. Nerv. & Ment. Dis., Vol. XXXI, 245–266, Baltimore: The Williams & Wilkins Co., 1953.
4. Henderson, D. K., and Gillespie, R. D.: *Textbook of Psychiatry*, Sixth Edition. New York: Oxford University Press, 1944.
5. Hunt, R. C.: The relation between precipitating situation and outcome in manic-depressive psychosis. *Am. J. Psychiat., 95:* 65–72, 1938.
6. Moss, L. M., and Hamilton, D. M.: The psychotherapy of the suicidal patient. *Am. J. Psychiat., 112:* 814–820, 1956.
7. Strecker, E. A., Appel, K. E., Eyman, E. V., Farr, C. B., LeMar, M. C., Palmer, H. D., and Smith, L. H. *The Prognosis in Manic-Depressive Psychosis*. A. Res. Nerv. & Ment. Dis., Vol. XI, 471–538, Baltimore: The Williams & Wilkins Co., 1931.
8. Wanklin, J. M., Fleming, D. F., Buck, C., and Hobbs, G. E.: Discharge and readmission among mental hospital patients. *Arch. Neurol. & Psychiat., 76:* 660–669, 1956.

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THE DIFFERENTIAL INCIDENCE OF RHEUMATIC FEVER IN THE HISTORIES OF PARANOID AND NON-PARANOID SCHIZOPHRENICS

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The suggestion that there is a connection between schizophrenia and rheumatic fever is familiar historically as Breutsch (2) shows in his survey of the pertinent literature. The present study suggests that it is only a particular *kind* of schizophrenia which is associated with rheumatic fever. That is, those schizophrenics with rheumatic histories seemed, in this sample, to exhibit a characteristic psychotic pattern in that they generally carried a non-paranoid diagnosis and had early onsets.

Breutsch (2) reported in 1940 that he found post-mortem evidence of an unusually high prevalence of rheumatic fever in schizophrenics. This impression was also formed independently by the writer during examination of the medical histories of schizophrenics from the Colorado Psychopathic Hospital in Denver. It was, however, difficult to find an adequate control group for the schizophrenics.

One estimate of rheumatic fever incidence in normals was obtained from the standard medical records of college freshmen at the University of Colorado. To equate for socio-economic factors, this estimate was compared with the rheumatic fever rate obtained (again, from standard medical records) for those schizophrenics who had themselves attained at least the first year of college. The schizophrenics showed a rheumatic history in 8.2 per cent of the 147 cases, or between three and four times as often as did the controls (2.4 per cent of 420 cases). These figures yielded a chi-square of 8.7, significant for one degree of freedom beyond the .01 level. The percentages noted are rather small, but the actual number of rheumatic fever cases may be much greater since apparently a large number of rheumatic episodes may fail to be diagnosed as such when they occur (10, 18).

However, not too much faith can be placed in these figures, based as they are on a rather poor control group. More interesting are some differences found in rheumatic fever rate among the different subgroups of schizophrenia; here one group of schizophrenics serves as a control for another, simplifying the control problem considerably.

The procedure was as follows: standard medical records taken on all patients under age 40 of both sexes, admitted to the Colorado Psychopathic Hospital with the diagnosis of schizophrenia from 1948 through 1956, were examined for any past or present sign of possible rheumatic involvement.[2] For reasons pertaining to another problem, all patients of Negro, Oriental, or Spanish American origin were omitted; this left almost 700 cases. The records were then classed into four groups:

Group 1 included cases where rheumatic fever was designated by name as a clear or probable event in the history. This group, with its relatively objective criterion, was used to establish the estimate of incidence for comparison with the normal control group above.

Group 2 included cases where rheumatic fever was not named, but symptoms described in the history could be interpreted as rheumatic (e.g., choreiform movements, polyarthritis in childhood, certain severe heart murmurs, and suggestive combinations of growing pains, nosebleeds, streptococcal infections, mild heart murmurs, rheumatic history in the family, etc.).

Group 3 included cases where symptoms indicated that rheumatic fever was possible but unlikely (e.g., symptoms such as growing pains, nosebleeds, etc., as above, but occurring more or less by themselves, with no further evidence of rheumatic disease).

[1] This study was done with the help of the Mary Anderson AAUW fellowship.

[2] The writer was not associated with the compilation of the records, nor had the hypotheses presented in this paper been formed at the time the male record were examined. Some of the hypotheses were roughly formed when the female records were examined; however, the trends found were equally strong in both male and female groups.

TABLE 1.—THE DIFFERENTIAL INCIDENCE OF RHEUMATIC FEVER IN THE HISTORIES OF PARANOID AND NON-PARANOID SCHIZOPHRENICS

	N	Paranoid Schizophrenics	Non-Paranoid Schizophrenics	Per Cent Non-Paranoid
Group 1 (Rheumatic fever named)	62	18 (4.9%)	44 (13.3%)	71
Group 2 (Rheumatic fever suspected)	93	28 (7.6%)	65 (19.7%)	70
Group 3 (Rheumatic fever unlikely)	92	50 (13.6%)	42 (12.7%)	46
Group 4 (Rheumatic fever absent)	450	271 (73.9%)	179 (54.3%)	40
Totals	697	367 (100%)	336 (100%)	47

Chi-square for the two by four table presented is 41, which indicates beyond the .000001 level of significance that the non-paranoid schizophrenics are more apt to have rheumatic histories than the paranoid schizophrenics.

Group 4 included cases where no significant evidence of rheumatic fever was found.

The most striking finding was that non-paranoid schizophrenics[3] exhibited rheumatic histories almost three times as often as did paranoid schizophrenics. (Male and female cases were combined because the trend was equally evidenced in each.) The figures are presented in table 1, which yields a chi-square of 41, which, for three degrees of freedom, would be expected by chance less than one time in a million. Thus it seems unlikely that we can consider chance the cause of the association between rheumatic fever history and non-paranoid schizophrenia found in this sample.

There are several possible interpretations of this finding. First, it may be due to error of diagnosis; second, both diseases may be associated through a third common factor; and third, they may be causally related.

1) Both schizophrenia and rheumatic fever share the quality of being rather hard to diagnose, especially in mild cases. Thus we might expect considerable error in both the variables associated here. Such error, however, if random in nature, could only serve to obscure the relationship found, not to cause it, so we must conclude that if error of diagnosis contributes to the association of rheumatic fever and non-paranoid schizophrenia, such error must be based on some factor common to the symptomatology on which each syndrome is diagnosed.

Bizarre, silly, or psychopathic-like behavior without a well-organized delusional system is one characteristic of non-paranoid schizophrenics which also appeared to the present investigator to be typical of many schizophrenics with rheumatic histories. No attempt was made to test this impression, however, as it would have been difficult to translate the impression into objective terms.

Age at onset is another possible determinant of diagnosis. As can be seen in table 2a, the relationship between age at onset and rheumatic history is of the same order as that between diagnosis and rheumatic history (table 1). Further analysis suggests that age at onset and diagnosis are both imperfect indices, and together give a better prediction than either one separately; the highest proportion of cases with a rheumatic type of history (42 per cent) is found in the schizophrenics who have both an early onset and a non-paranoid diagnosis (table 2b).

This still leaves unanswered the question as to *why* patients with rheumatic histories should have early onsets and/or a non-paranoid diagnosis.

2) Attempting to answer the "why" by looking beyond purely symptomatological characteristics, there are several factors which

[3] The term "non-paranoid schizophrenic" here refers to all subtypes of schizophrenia other than "paranoid". Actually, there were also some smaller differences in rheumatic fever rate among the non-paranoid subtypes of schizophrenia, but they were less striking and less consistent than the difference between the non-paranoid subtypes in general, and the paranoid subtype. Hebephrenics, generally, seemed to show the highest percentage of rheumatic histories [45% of the 31 hebephrenic records were classed as either Group 1 (19%) or Group 2 (26%), while only 35% of them were classed in Group 4].

TABLE 2

TABLE 2A: THE RELATIONSHIP BETWEEN AGE AT PSYCHOTIC ONSET AND RHEUMATIC HISTORY IN SCHIZOPHRENICS

Age at Schizophrenic Onset	Groups 3 & 4 ("Non-Rheumatic")	Groups 1 & 2 ("Rheumatic")	Per Cent "Rheumatic"
3–21	166	81	33 $\chi^2 = 26.6$
22–27	169	40	19 d.f. = 2
28+	207	34	14 P = .000001

occur by chance 8 times in 10, as determined by chi-square.

A constitutional factor which would serve to connect rheumatic fever with paranoid schizophrenia might be found on careful study of the circulatory system in each disease. This system, so often critically involved in rheumatic fever, has also been shown by several investigators (6, 9, 17) to exhibit a hypoplastic structure in many non-paranoid schizophrenics as well as in schizophrenics with early onset (17).[4] Further

TABLE 2B: THE RELATIONSHIP BETWEEN DIAGNOSIS AND RHEUMATIC HISTORY IN DIFFERENT ONSET-AGE RANGES

Age at Onset		Diagnosed Paranoid	Diagnosed Non-Paranoid
3–21 (N = 247)	Groups 1 & 2	15	66 $\chi^2 = 17.5$
	Groups 3 & 4	76	90 d.f. = 1
			P = <.0001
	Per cent "rheumatic"	16%	42%
22–27 (N = 209)	Groups 1 & 2	12	28 $\chi^2 = 12.2$
	Groups 3 & 4	102	67 d.f. = 1
			P = <.001
	Per cent "rheumatic"	11%	29%
28+ (N = 241)	Groups 1 & 2	19	15 $\chi^2 = 2.3$
	Groups 3 & 4	143	64 d.f. = 1
			P = <.20
	Per cent "rheumatic"	12%	19%

might underlie the relationship between rheumatic fever and diagnosis or onset age.

Socio-economic condition seems to be one likely candidate. Rheumatic fever is most commonly found among people of low socio-economic condition (18), and the non-paranoid schizophrenics might also be drawn primarily from this group since some of them, at least, seem to have a lower average I.Q. (15). An attempt was made to test this hypothesis, using I.Q. and level of schooling as indices of socio-economic level, where such data were available. However, while the schizophrenics with rheumatic histories did tend to have a very slightly lower level of schooling and I.Q., these differences were surprisingly insignificant statistically, and it seems unlikely that they were strong enough to explain the relationship found here between rheumatic fever history and non-paranoid schizophrenia. For both I.Q. and level of schooling, the differences found were so slight that they would be expected to

evidence of a connection is offered by Davis and Landau (5), who indicate that patients with rheumatic diathesis frequently exhibit a type of capillary structure very much like that found in the non-paranoid, early schizophrenias (6, 17). The similarity of the capillary picture in the two diseases is rather striking, and it would be interesting to see whether or not prevalence of this picture among non-paranoid schizophrenics could be attributed to the presence of many patients with rheumatic diathesis in this group.

[4] The "hypoplastic" capillary picture is normall found in children, and tends to disappear as part o the growth process in attaining adulthood (11). People failing to show this normal growth (as evidenced by a persistent "hypoplastic" capillary picture) might be considered to enter a critical period during the growing years, when the demands on the circulatory system are increased, but the structure serving those demands fails to grow correspondingly. That this handicap might be related to early psychotic onset (during those same growing years) was previously suggested (17). The following discussion gives one possible way in which the handicap might act, that is, through the mediation of rheumatic disease.

Another area that suggests itself strongly as linking the two diseases is that of adrenal cortical function. It has been suggested that hypo-responsiveness of the adrenal cortex may be significantly involved in the etiology of rheumatic fever (1,7). Schizophrenics in general, though not the non-paranoid schizophrenics in particular, also have been considered to show a hypo-responsiveness of the adrenal cortex to a variety of stresses (13). A critical test should eventually be performed here as to whether or not the lower adrenal cortex responsiveness reported in schizophrenia is found independently of rheumatic history.

Adrenal cortical hormones operate in a number of ways in the body, one of their effects being the maintenance of capillary tone (12). Considering the capillary findings discussed above, this is particularly interesting. Poor adrenal cortical response and hypoplastic circulatory structure might both be seen as contributing to poor capillary tone; and inflammation of the capillaries produced by rheumatic fever might further decrease the competence of the capillaries to the point where they fail to perform adequately, or even to the point of hemorrhage. Capillary hemorrhage is common in rheumatic fever (e.g., nosebleeds), and capillary hemorrhages have been found in the brain at autopsy after acute rheumatic fever (4). Such minute hemorrhages might be expected to produce diffuse, highly generalized damage to the nervous tissue of the brain (such, perhaps, as the frequent, but not clearly established reports of disappearance of some ganglion cells in schizophrenic brains (19)), yielding a deficit which would not show up well in the grosser reflex tests of the neurological examination, while being perhaps highly appropriate to the subtler abnormalities of schizophrenia. Here, as in arteriosclerotic brain damage, the degree of psychosis would presumably depend on the psychological adjustment of the individual as well as on the amount and location of the brain damage.

Of course one need not assume gross anatomical damage. Especially in the early stages, one need only assume that the capillary damage would be sufficient to interfere with the normal exchange of materials between the blood and the brain. Such interference might, hypothetically, lead to a toxic or deficient state in the brain sufficient to induce an acute, reversible, psychotic reaction.[5] Repeated or prolonged exposure to such capillary insufficiency, or the occurrence of hemorrhagic lesions, might produce permanent damage with a more chronic picture.

Rheumatic fever manifests itself in a variety of ways: disease of the heart valves, migratory polyarthritis, chorea, encephalitis, and probably pneumonia (7). Breutsch (3) indicates that rheumatic fever may also occasionally have a psychotic result; and it may be that, at least in the present sample, such psychoses are sometimes diagnosed as non-paranoid schizophrenia.

In line with this possibility, several cases were found among those studied where the psychotic episode seemed to follow rather directly upon a rheumatic episode, giving some support to a causative interpretation. Thirty-nine (63 per cent) of the 62 cases in Group 1 showed symptoms just preceding a psychotic episode which could be interpreted as rheumatic or as signs of streptococcal infection.[6] In many of the cases where this pattern was not recorded, information concerning the onset period was totally lacking or very limited. In 12, or about a third, of the 39 cases with infectious symptoms preceding the psychotic episode, these infectious symptoms were actually diagnosed as rheumatic fever. Seventy-five (80 per cent) of the Group 2 cases had symptoms consistent with rheumatic fever or streptococcal infection shortly preceding the psychotic episode. This higher percentage reflects the fact that just such signs, if severe enough, were often the reason for assigning cases to Group 2; hence this finding is, in a sense, an artifact. It is hard to know just how to find a control group for these figures; the prevalence of streptococcal or rheumatic symptoms in Groups 3 and 4 is considerably lower than in Groups 1 and 2, but the groups are so defined as to make this inevitable. At present we can only say that it is

[5] Although it is probably not the way in which LSD (14) acts to produce its psychotic effect, perhaps the fact that LSD does increase capillary fragility (8) should not be overlooked.

[6] It is now generally believed that an infection with Group A hemolytic streptococci is a necessary, but not sufficient, causal factor in rheumatic fever (16). Unknown environmental and constitutional factors are also believed to play a part, and an important part, since only about 3 per cent of overt infections with group A hemolytic streptococci seem to result in rheumatic fever (16).

not uncommon to find a history of symptoms suggestive of rheumatic or streptococcal involvement in the time just preceding a schizophrenic episode. Such a finding, even if proven significant, would of course support a number of different theories equally well.

It is interesting, in view of the relationships presented here, that rheumatic fever and schizophrenia share a number of characteristics, among them early onset, some familial tendency, and often an exacerbative, downhill course. Preliminary work has been done in some of these areas, and will be reported in a future communication.

It should be emphasized that there is no reason to believe, from the present data, that rheumatic fever is related to all, or even a very large portion of all, the cases diagnosed as schizophrenia. However, if rheumatic fever can be validly implicated in even a portion of cases, it does suggest new directions for therapy and prevention. Perhaps equally important, if any group within the present "wastebasket" category of schizophrenia can be legitimately separated out on the basis of etiology, such separation should simplify the study of the remaining cases.

Summary

1. An excess of rheumatic fever histories was found among schizophrenics who exhibited two main characteristics: a non-paranoid schizophrenic diagnosis, and an early onset age.

2. Socio-economic condition, insofar as it could be tested by I.Q. and schooling level, was found not to contribute significantly to this result.

3. Hypoplastic capillary structure and hypofunction of the adrenal cortex have been claimed in both rheumatic fever and schizophrenia. Critical statistical tests to see whether these constitute a legitimate source of linkage between the two diseases are suggested.

4. A tentative formulation is presented suggesting that capillary hypoplasia, adrenal cortical hypofunction, and rheumatic inflammation of the capillaries may act synergistically to produce capillary damage in the brain, the type of generalized brain trauma ensuing being conducive to a schizophreniform psychotic breakdown.

5. Rheumatic fever, if it contributes at all to the schizophrenic process, is probably involved in only a rather small portion of the cases, and is seen as a possible complication of the problem of schizophrenia rather than as a solution to the whole problem.

BIBLIOGRAPHY

1. Ainger, L. E., *et al.*: Sydenham's chorea. *Am. J. Dis. Child., 89:* 580–590, 1955.
2. Breutsch, W. L.: Chronic brain disease as a possible factor in causation of cases of Dementia Praecox. *Am. J. Psychiat., 97:* 276–296, 1940.
3. Breutsch, W. L.: Mental disorders arising from organic disease, Chap. 2. In *The Biology of Mental Health and Disease.* New York: Milbank Memorial Fund, Paul B. Hoeber, Inc., 1952.
4. Costero: Cited by Davis, E., and Landau, J. (5).
5. Davis, E., and Landau, J.: Capillary microscopy in rheumatic fever. *Arch. Int. Med., 97:* 51–56, 1956.
6. Hauptmann, A., and Myerson, A.: Studies of finger capillaries in schizophrenia and manic-depressive psychoses. *J. Nerv. & Ment. Dis., 108:* 91–108, 1948.
7. Holbrook, Paul: Rheumatic fever, Chap. 36. In *Arthritis.* Comroe, B. I. Philadelphia: Lea and Febinger, 1949.
8. Ingram, G., *et al.*: Lowered capillary resistance after iontophoresis of Lysergic acid diethylamide. *Nature, 176:* 563, 1956.
9. Lewis, N. D. C.: Constitutional factors in dementia praecox with particular attention to the circulatory system and to some of the endocrine glands. Washington, D. C.: Nerv. & Ment. Dis. Monograph 35, 1926.
10. Maresh, G. J., Dodge, H. J., and Lichty, J. A.: Incidence of heart disease among Colorado school children. *J.A.M.A., 149:* 802–805, 1952.
11. Müller, O.: *Die Kapillaren der menschlichen Korperoberfläche in gesunden und kranken Tagen.* Stuttgart: Ferdinand Enks, 1922.
12. Noble, R. L.: Physiology of the adrenal cortex, Chap. III. In *The Hormones,* Vol. II. Pincus, G., and Thimann, K. New York: Academic Press, Inc., 1950.
13. Pincus, G., and Hoagland, H.: Adrenal cortical responses to stress in normal men and in those with personality disorders; some stress responses in normal and psychotic subjects. *Am. J. Psychiat., 106:* 641–650, 1950.
14. Rinkel, M., *et al.*: Experimental schizophrenic-like symptoms. *Am. J. Psychiat., 108:* 572–577, 1952.
15. Roe, A., and Shakow, D.: Intelligence in mental disorder, Chap. 26. In *Contemporary Psychopathology.* Thompkins, S. S. Cambridge, Mass.: Harvard University Press, 1947.
16. Thomas, L., ed.: *Rheumatic fever: A Symposium.* Minneapolis Minn.: University of Minn. Press, 1952.
17. Wertheimer, N., and Wertheimer, M.: Capillary structure: its relation to psychiatric diagnosis and morphology. *J. Nerv. & Ment. Dis., 122:* 14–27, 1955.
18. White, P. D.: Rheumatic heart disease, Chap XIII. In *Heart Disease.* White, P. D. New York: The Macmillan Company, 1931.
19. Wolf, A., and Cowen, D.: Histopathology of schizophrenia and other psychoses of unknown origin. In *Biology of Mental Health and Disease.* New York: Milbank Memorial Fund, Paul E. Hoeber, Inc., 1952.

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BOOK REVIEWS

Ruesch, Jurgen. DISTURBED COMMUNICATION: THE CLINICAL ASSESSMENT OF NORMAL AND PATHOLOGICAL COMMUNICATIVE BEHAVIOR. (New York: W. W. Norton & Co., pp. ix + 337, 1957. $6.00).

This book is a natural sequel to *Communication: The Social Matrix of Psychiatry* by Ruesch and Bateson which was published in 1951. Forty per cent of this book (excluding index and references), or its last chapter, contains "a guide to the clinical observation of communicative behavior." This is a detailed outline of a clinical examination designed to make an assessment of communication complete and systematic. The outline is indeed thorough and well organized though lengthy and complex. It is unlikely that it can be used reliably without much clinical experience. The outline can be very useful for many other purposes, in addition to the study of communication. All kinds of psychological data can be used to check the items: interviews of the patient alone and in the presence of others, case histories, test data, etc. The seventh chapter provides a brief introduction for those who plan to use the guide. The author defines communicative behavior in these terms: "Communication is that human function which enables people to relate to each other. By means of signals and signs, human beings exchange views, express inner thoughts and feelings, make agreements, and state disagreements. In communication theory, the assumption is made that information controls behavior and that by studying information and its exchange one can obtain a better understanding of human behavior. Among the behavorial disciplines, psychiatry is that field of human endeavor which is devoted to the study and treatment of conditions which prevent the successful interrelation of people. Specifically, it is concerned with those structural and functional disturbances which arise within the individual or in small groups and interfere with the successful exchange of messages."

This definition implies that the entire field of psychopathology and neuropsychiatry could be re-written in terms of "communication theory", i.e. with an emphasis on the breakdown of communication between the patient and others. Thus the psychosexual etiology or the specific defenses against anxiety are usually stressed in the investigation of neurotics. The communication theorist, by contrast, is interested primarily in the special defects of information (regarding himself and others) characterizing the hysteric, the obsessive, the phobic case. However, in order to gain an adequate understanding of the defects of information as well as of the etiology and dynamics (defenses) of the patient, both the patient's information and his psychodynamics must be considered and analyzed. The book is valuable in drawing attention to the social aspect of the psychosocial nature of interhuman relations. It contains many felicitous expressions which enable the reader to see old ideas in a somewhat different light. The reader may not always agree with the new viewpoint. This is likely to occur when the author proceeds on the (silent) assumption that if a patient's communication with others breaks down, it can be restored if others take special care to improve communication and thus give the patient "appropriate social exercise." The questionable assumption is that since breakdown of communication is a social phenomenon, manipulation of social conditions (outside and around the patient) will cause the patient to regain the ability adequately to communicate with others (e.g., in the case of schizophrenia). Nevertheless communication theory is refreshing in focusing our attention on the modern concept of mutual understanding. The author's presentation is lucid and simple, and has a high degree of inner consistency. A. Ayer, A. Korzybski, and N. Wiener are cited as the leading theorists of communication. This new book by a known writer and thinker is both interesting and constructive especially for those who know psychopathology. The beginner is likely to miss the original features but will get a great deal of valuable information about the ill effects of various forms of defective interhuman communication.

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Eisennstein, Victor W. NEUROTIC INTERACTION IN MARRIAGE (New York: Basic Books, Inc., pp. xv + 352, 1956. $5.50.)

Twenty-give psychiatrists, psychologists, and social workers, most of them leaders in their professions have contributed to this informative and authoritative volume. The eighteen chapters discuss a great variety of problems which one finds in unhappy marriages. In this book, complexity of modern marriage is evaluated also from the standpoint of anthropology, law, education, and children. In his Foreword, Nolan D. C. Lewis, states that the authors have followed sound scientific principles as far as this type of material allows, and that the book provide therapeutic guidance for workers who are involved in the scientific investigation and practical correction of the numerous problems of family life. Most of the investigations, reported here, were sponsored by the Psychiatric Forum Group of New York under the leadership of Victor Eisenstein, in the last eight years. The marital relationship is discussed in terms of diagnosis, prognosis, and treatment. A ten page index helps to make this a handy, well-written, and very useful reference book which has—in addition to generally accepted and tried-out ideas—a fair share of new ideas and new observations.

Z. A. PIOTROWSKI

Oliven, John F. SEXUAL HYGIENE AND PATHOLOGY. Pp. 481, 1955. Philadelphia: J. B. Lippincott Co., $10.00.

This manual is designed to fill the needs of patients for information on sexual matters by their family physician. All phases of sexuality, the normal and the pathological, are comprehensively reviewed in one of the four sections of this volume: Sexuality in Childhood, Sexuality in the Second Decade, Sexuality of the Normal Adult and Sexual Pathology.

Numerous specific techniques are described, such as instruction for premarital examinations, instruction of parents with regard to their children's sex education, and instruction of sexual techniques. Parental problems which may arise are clearly outlined, such as differential diagnosis and prognosis of homoerotic tendencies in adolescents, and sexual deviations.

Some areas are notably weak, such as the section on sexual pathology. Yet it is quite understandable that to include a complete description would require not a section but an encyclopedia. Many questions which are quite controversal are treated as a priori truths, such as constitutional factors in homosexuality. The manual is well written, concise, and provides the reader with a wealth of data. One need only consult the index to get at the material.

The author has carried out the goal outlined in the preface: "In our day and age people are entitled to physicians who know the answers to personal health and hygiene questions and will not skirt around the subject of sex." This volume is recommended as a "must" for all physicians.

Pearson, Gerald. PSYCHOANALYSIS AND THE EDUCATION OF THE CHILD. Pp. 357, 1954. New York: W. W. Norton & Co., $5.00

This provacative volume presents the contributions of psychoanalysis to the field of education. It seems strange that this monograph should be so late in appearing, yet it is the first volume which provides a systematic application of psychoanalytic formulations to the process of education.

The analytic process, which has been emphasizing ego psychology in recent years, has been applied to learning process and to the development of moral sense. This concept coincides with the fundamental purposes of education: technical and intellectual knowledge and a moral sense. Technical and intellectual concepts have the purpose of preparing the student for the demands of reality. The moral sense is important in giving form and discipline to our impulses.

The vicissitudes of the primary and secondary process are discussed with reference to learning difficulties. Learning can occur only with the onset of the secondary process. Disorders of learning are evaluated, and those factors which may hinder the ego organization are interpreted in the light of this process.

The author believes that the genesis of creativity is the conflict between the ego and instinctual demands. One does feel that this is not true creativity. It seems more likely that

true creativity has its origin in the conflict-free areas of the ego described so aptly by Hartman.

Dr. Pearson illustrates specific techniques for improvement of the learning process. These recommendations do indicate that the author is aware of all facets of the learning process.

At times one feels that Dr. Pearson applies myopic psychoanalytic formulations to explain learning, such as the mind being a battlefield with the "Goliath" Id lusting to destroy the "David" Ego. The bibliography which is quite extensive lists only classical analysts. The contributions of Fromm, Horney and Sullivan are ignored.

This volume should be required reading for all educators.

Lorand, S. (Ed.) YEARBOOK OF PSYCHOANALYSIS, Vol. X. Pp. 277, 1954. New York: International Universities Press, $7.50.

This yearbook has repeated its tradition in selecting again the best that has appeared in the psychoanalytic literature of that year. The articles which were selected reflect the timely emphasis on current problems in clinical and theoretical psychiatry. Anthropology, mythology, pathography are some of the areas which are included to give the reader a general survey of psychoanalysis.

Beinfeld has an illuminating fragment on Freud's study on cocaine. This material was utilized by Jones in his biography of Freud. Muriel Gardiner has a follow-up note on the "meetings with the wolf-man." This note provides us with one of the finest longitudinal studies, a study which began with Freud, was followed subsequently for several episodes by Mack-Brunswick and continued for another twenty years by Gardiner.

"Schreber's Prepsychotic Phase" by Katan was originally published in the *International Journal of Psychoanalysis*. One must marvel at the completeness of this analyst in his evaluation of the factors in the Schreber case.

The editorial board selected outstanding papers by Winnicott, Reider, Feldman, Bak, Gero, Reich, Sterba, Knapp, Lewin, Heilbrun, Saul, Barrett, Roheim, and Loewenberg to be included in this volume. There is a fascinating paper by Devereux on "Why Oedipus Killed Laius." The traditional conception of the Greek tragedy is an account of man's helplessness in the face of undeserved fate. He feels that Greek drama is not a tragedy set in motion by a fate external to man, but by man's character structure and latent conflicts.

This yearbook has gathered the most important contributions which appeared in numerous publications into one volume. This means that this volume will be a valuable source book. This monograph is recommended for all disciplines.

Ingham, Harrington and Love, Lenore. THE PROCESS OF PSYCHOTHERAPY. Pp. 270, 1954, New York: McGraw Hill Book Co., $5.00.

Drs. Ingham and Love, who have worked in the psychiatric section of the student health service of U.C.L.A. for many years, provide a systematic description of the principles of psychotherapy. The dynamic factors which are present in the therapeutic situation are gristle for analysis by these authors. Recognition of actual and distorted manifestations of the mutual relationship of patient and psychiatrist is described as an all important psychotherapeutic instrument.

Numerous clinical problems are discussed: criteria of treatability, phases of treatment, complexities, psychological tests and value judgements. Two case studies are presented to embellish the principles outlined in the fifteen chapters.

The authors minimize the importance of personality theory and feel that "formulations have been couched in overlapping and ill-defined terminologies which have hindered rather than aided communication among different groups." This criticism has much validity, yet the absence of a theoretical framework makes this volume lack depth in many areas. No distinction is made in the treatment of psychotics and neurotics. The authors' techniques are quite authoritarian. They make widespread use of reassurance and instruction that at times causes one to question whether it is therapy or counseling.

The volume shows a great deal of warmth and awareness of the nuances of the treatment process.

Livingston, Samuel. THE DIAGNOSIS AND TREATMENT OF CONVULSIVE DISORDERS IN CHILDREN. Pp. 314, 1954 Springfield, Ill.: Charles C. Thomas, $9.50.

Dr. Livingston, the physician in charge of the Epilepsy Clinic at Johns Hopkins, has written a lucid yet comprehensive monograph on convulsive disorders. The purpose of this volume is to provide the family physician with sufficient tools to diagnose and adequately treat this ubiquitous disorder. The material was originally presented in lecture form and expanded to include most salient questions which are essential in understanding this illness.

The author describes the various facets of convulsive disorders by discussing it from fifteen different areas: diagnosis of convulsion, treatment of isolated convulsions, cryptogenic and secondary epilepsy, disorders simulating epilepsy, classification of seizures, precipitating factors, roentgenography, electroencephalography, general plan of treatment, drug and dietary therapy and social management. Dr. Earl Walker has included a section on the surgical treatment of this disorder. Each section is followed by a detailed bibliography.

Convulsive disorders have their onset during the early years of life. It has been estimated that 90% of the patients with convulsive disorders had their initial seizure in childhood. A histogram of the frequency of cryptogenic epilepsy indicated the ages between four and eight as the period when this illness first emerges. In a study of 2300 cases seen at this clinic, 53% had generalized major motor seizures, 13½% had petit mal attacks and 32½% had mixed types.

Dr. Livingston has simplified the classification of this disorder. The older terminology has been dropped, and more meaningful concepts are utilized; i.e., pyknolepsy is replaced by the term petit mal (simple staring). Minor motor seizures are classified according to the categories devised by Lennox: akinetic and myoclonic types. Numerous case histories are cited to illustrate the similarities and differences of these disorders.

Secondary epilepsy is described as a "convulsive disorder which appears in association with or subsequent to some evidence of brain damage." The causal factor in the majority of cases is the birth trauma. In 601 of the 650 patients who suffered from epilepsy secondary to a cerebral birth injury, focal characteristics were presented. The seizures were major motor convulsions in most cases. Minor motor spells of the akinetic or myoclonic type were also observed. Simple petit mal spells were not observed.

The author provides a detailed differential diagnosis, and specific technques are described to rule out disorders which simulate epilspsy. There is an excellent discussion on interpreting pneumoencephalograms and electroencephalograms. There are numerous photographs and records to embellish the material. Under "Drug Therapy" the reader is given a detailed outline on how to initiate and work out a drug schedule for the epileptic.

The role of emotional factors is reduced to a minimum. Dr. Livingston allocates about one-third of one page to this factor, yet by contrast he allocates two-thirds of a page to the similarity of masturbation and pure petit mal. The social management section is written by Francis Schwentker and details specific problems and their answers on topics of marriage, training for productive work and institutional care.

This volume fills a real need and should be read by all who wish to understand this perplexing disorder.

Genetics and the Inheritance of Integrated Neurological and Psychiatric Patterns. Edited by Davenport Hooker and Clarence C. Hare. Association for Research in Nervous and Mental Disease, Vol. 33. Price, $10.00. Pp. 425. Williams and Wilkins Co., Baltimore. 1954.

This volume is based on the 1953 proceedings of the Association for Research in Nervous and Mental Disease. This is the second time in thirty years that this association has considered the subject of inherited factors in nervous and mental disease. Genetics as a scientific specialty has come of age, and medicine looks to it for help in unraveling some of its problems.

The first part of this volume is devoted to a discussion on genetics, human inheritance and environmental effects. The reader who is not

acquainted with this specialty is introduced to the terminology and concepts with remarkable simplicity. These six chapters are crammed with kernels of genetic truths.

Part two deals with the problems of neurological and mental patterns and their inheritance. The editors have performed a herculean task in selecting the best papers of their two-day conference. The authors and discussants of these papers represent the Who's Who of medical genetics. Outstanding clinicians, such as Kallman, Kanner, Senn, Lewis, Hooker, Ginsberg, Anatasi present a multi-disciplinary approach to many facets of the problem of inheritance and disease process.

It would not be possible to summarize the many fine papers, but included are such areas as phylogenetic development of behavior patterns, fetal behavior, continuity of neural mechanisms, development of intelligence, personality development in the child, phenylketonuria, neuromuscular disorders, hereditary ataxias, psychosis, adaptability, plus numerous other fascinating areas.

The volume is well written, concise, documented, and contains numerous diagrams and photographs to explain the salient features. Each chapter has an extensive bibliography. This book should be a must for all clinicians and required reading for all research workers in neurology, psychiatry and psychology.

LOUIS L. LUNSKY

BOOKS RECEIVED FOR REVIEW

March, 1957

BEUTNER, KARL R. AND HALE, NATHAN, G., JR. *Emotional Illness: How Families Can Help*. G. P. Putnam's Sons, New York, N. Y.

BRUCH, HILDE. *The Importance of Overweight*. W. W. Norton & Co., Inc., New York, N. Y.

COIRAULT, R. AND LABORIT, H. *Le Delirium Tremens*. Masson & Cie, Paris, France.

CRAWFORD, JOHN P. *Psychosynthesis*. Ash & Co., Ltd., London, England.

GROSSJOHANN, ARTUR. *Körperliche und Geistige Eignung zum Führen von Kraftfahrzeugen Bei Hirnverletzten*. Georg Thieme, Stuttgart, Germany.

HECAEN, H. AND DEAJURIAGUERRA, J. *Troubles Mentaux au cours des Tumeurs Intracraniennes*. Masson & Cie, Paris, France.

ROSEN, ELIZABETH. *Dance in Psychotherapy*. Bureau of Publications, Teachers College, Columbia University, New York, N. Y.

RUESCH, JURGEN. *Disturbed Communication*. W. W. Norton & Co., Inc., New York, N. Y.

STECKLE, LYNDE C. *Problems of Human Adjustment*. Harper and Bros., New York, N. Y.

STERN, EDITH M. *Mental Illness: A Guide for the Family*. Harper and Bros., New York, N. Y.

WILLIAMS, ROGER J. *Biochemical Individuality*. John Wiley & Sons, Inc., New York, N. Y.

WOLF, STEWART. *The Evaluation of Therapeutic Agents*. American Psychiatric Association, Washington, D. C.

WOLFENSTEIN, MARTHA. *Disaster: A Psychological Essay*. The Free Press, Glencoe, Illinois.

WORMHOUDT, ARTHUR. *Hamlet's Mouse Trap*. Philosophical Library, Inc., New York, N. Y.

YATES, DOROTHY HAZELTINE. *Psychology You Can Use*. Thomas Y. Crowell Co., New York, N. Y.

NOTES AND NEWS

DIVISIONAL MEETING
AMERICAN PSYCHIATRIC ASSOCIATION

Hotel Roosevelt, New York City,
November 15–17, 1957

Sponsored by the New York State
District Branches

Plans are well under way for the N. Y. State Divisional Meeting of the American Psychiatric Association to be held in New York City, November 15–17, 1957, to which all APA members are cordially invited. As this is the first APA meeting to be held in New York City for many years, it is expected that the attendance will be unusually large. Although there has been no prior public announcement, the grapevine has been effective and the Program Committee has already been offered papers.

The Committee will earnestly consider any paper focused about the following suggested subjects: Relationship of Communication Theories to Psychiatry; Role of Altered States of Consciousness to Behavior; Experimental Psychopathological Reactions; Delinquency and Addiction; Industrial Psychiatry; Evaluation of Therapy.

In addition it is anticipated that Round Tables will be held on the following subjects: Psychiatry in the General Hospital; Outpatient Care; Research Trends; The Open Hospital.

Dr. Marvin Stern, Chairman.
N. Y. U. College of Medicine
550 First Ave., New York 16, N. Y.

DELAWARE PSYCHIATRIC SOCIETY

The following have been elected to the Delaware Psychiatric Society:

President—Dr. George DeCherney
Vice President—Dr. James Flaherty
Secretary—Treasurer: Dr. Walter Davis
Councillors: Dr. Charles Katz
Dr. Sanford Rogg

WORKSHOP IN PSYCHOTHERAPY

The American Academy of Psychotherapists is holding a Workshop in Psychotherapy at the University of Wisconsin, August 4–7 inclusive. The invitation to meet at Madison was issued jointly by the Departments of Psychiatry and Psychology of the University. Members of the Academy are eligible to attend. The planning committee consists of Albert Ellis, Ph.D., New York City; Thomas P. Malone, M. D., Atlanta, Georgia; Robert Roessler, M. D., Madison, Wisconsin, and Carl R. Rogers, Ph.D., Chairman, 5737 Drexel Ave., Chicago 37, Illinois. Inquiries should be directed to the chairman.

KITCHENS FOR MENTAL PATIENTS

Physicians at the Veterans Administration hospital in Sepulveda, California, have a new "recipe" for treatment of their mentally ill patients.

It is a special kitchen donated by the Helpers, a San Fernando Valley, California women's philanthropic organization.

The kitchen promotes wholesome group activity. Patients work together and with members of the hospital staff in planning, preparing, and serving meals, and in such activity they learn to plan together and do things for themselves and other people. This type of pleasant socializing experience helps prepare patients to their homes and the community.

Food supplies for the kitchen will be furnished by the California Department of the American War Mothers and the Northridge-Chatsworth, California 4-H Club. Both men and women patients will use the kitchen upon approval of their ward physicians. Similar special kitchens for patients have been established in other Va hospitals.

SECOND INTERNATIONAL CONGRESS FOR GROUP PSYCHOTHERAPY

From August 29 to 31, there will be held in Zurich the Second International Congress for Group Psychotherapy.

Presidents of the congress are: J. L. Moreno, U. S. A.; S. R. Slavson, U. S. A.: W. Hulse, U. S. A.; J. Bierer, England; S. Lebovici, France, and W. J. Warner, U. S. A. Congress fee: Swiss francs 40. Chairman of the

program, Dr. Serge Lebovici, 3, Ave. du, Président Wilson, Paris 16e, will also accept papers and symposia.

Chairman of the Local Arrangements Committee is Dr. Adolf Guggenbühl-Craig, Lenggstrasse 28, Zurich 8. Application for participation as well as all inquiries should be directed to his address.

ISAAC RAY AWARD

Dr. Manfred S. Guttmacher, psychiatrist and Chief Medical Officer of the Supreme Bench of Baltimore, Md., is the sixth winner of the $1000 Isaac Ray Lectureship Award of the American Psychiatric Association, it was announced at APA's annual meeting here today. The Award is given annually to a psychiatrist, lawyer or judge for contributing importantly to better understanding between Psychiatry and Law.

As recipient Dr. Guttmacher will deliver a series of lectures on psychiatry and the law under the sponsorship of the Schools of Law and Medicine at the University of Minnesota in the academic year 1957–1958.

The Award commemorates Dr. Isaac Ray, a founder of APA, whose remarkable "Treatise on the Medical Jurisprudence of Insanity" published in 1838 was for many years the standard work on the subject.

FIFTH INTERNATIONAL CONGRESS ON INTERNAL MEDICINE

The International Society of Internal Medicine has announced that its Fifth International Congress of Internal Medicine will be held at the new Sheraton Hotel, Philadelphia, Pennsylvania, April 24–26, 1958. This will be the first meeting of the Society outside of Europe. In making the announcement, the International Society's President, Sir Russell Brain, who is also President of the Royal College of Physicians of London, said, "The Execuve Committe of the Society has chosen the United States for its Fifth Congress in response to an invitation extended by the American College of Physicians and with the objective of securing greater American participation in its deliberations and of allowing foreign members, at first hand, to learn more about American developments in the medical sciences".

The previous Congresses, at two year intervals, were held in Paris, London, Stockholm and Madrid. At those meetings, however, the United States, as well as many other nations throughout the world, was represented. The present membership of the Society, including forty-eight nations, is about 3,000.

This Society, the only international one embracing all aspects of internal medicine was organized in 1948 and largely at the instigation of Professor Nanna Svartz of Stockholm, the physician to the King of Sweden. It was her contention that the various branches of internal medicine should be kept in touch with one another, as is accomplished in North America by the American College of Physicians, and that this should be done on a truly international basis. She also emphasized the importance of purely personal and non-political contacts among physicians of different countries.

The Program Committee includes Frank N. Allan, M. D., Chairman, Boston; Philip S. Hench, M. D., Rochester, Minnesota; Carl V. Moore, M. D., St. Louis; Albert M. Snell, M. D., Palo Alto, California; Irving S. Wright, M. D., New York.

NEW STATE HOSPITAL FOR NEW YORK

Plans for the first new mental hospital to be built by the state in 25 years were revealed when Governor Averell Harriman inspected a model of the institution placed on view at the State Office Building. The $70,000,000 institution, to accommodate 3,000 patients, will be located in New York City in the Bronx, adjacent to the Albert Einstein Medical Center, the East Bronx General Hospital, and the East Bronx Tuberculosis Hospital.

The 125-acre site along the Hutchinson River Parkway, now a marshy waste, has been acquired by the state and is being ballasted, consolidated, filled and graded in preparation for construction.

"The new hospital," the Governor said, "is intended to reduce overcrowding in existing hospitals in the metropolitan area. Its urban location is in line with today's philosophy of establishing mental hospitals in the population

center, where both professional and nonprofessional staff is readily available, visitors have easy access, and the institution can operate as a psychiatric center for the community."

According to operating plans outlined by Dr. Paul H. Hoch, Commissioner of Mental Hygiene, the hospital will serve the Bronx and its residents, providing both inpatient and outpatient care, including the new day hospital type of service, where patients spend the day participating in a regular therapeutic program and return to their homes at night. An aftercare clinic for patients who have left state hospitals is already in operation in the Bronx for residents of the borough.

Dr. Hoch said that the hospital will work in cooperation with the Albert Einstein College of Medicine, providing for the college resources for psychiatric teaching material and availing itself of the consultant services offered by the school's highly qualified specialists. The availability of such specialists in all medical branches, he said, guarantees good general medical and surgical care of patients. The hospital will be staffed with its own full time psychiatrists.

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